

Université de Montréal

# **Inequalities in access to health care in urban south India**

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## IDENTIFICATION DU JURY

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Inequalities in access to health care in urban south India

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## SUMMARY

Kerala - in South India - has favourable indicators of human development, a high availability of public health services, and high levels of utilisation of health services. It is often cited as a model of *good health at low cost*. However, the private sector is increasingly more available than the public sector. This translates into a high recourse to private care. We know little about social inequalities in access to health care - especially in urban areas - in Kerala.

Our analyses suggest that the poor and casual workers have lower access to health care compared to more favoured populations. These two defavoured groups also have a higher propensity to turn to public services for care, despite indications of lower availability and lower quality compared to services offered in the private sector. Poor populations - despite lower access and restriction in their consumption of services - are also subjected to a higher economic burden of care, particularly in the private sector. Restriction in access is associated with deprivation in the urban context and lower density of health care providers. The public sector seems to play a particular role in facilitating access to health care for poor populations. The density of private services - which is higher in more privileged areas and larger cities - stimulates the utilisation of private services.

Despite a high level of human development, socio-economic inequalities in access to health care remain in urban areas in Kerala. These inequalities are linked to personal deprivation and to characteristics of urban environments. In a context characterised by an ageing population and increase in chronic illnesses, the consolidation of public health sector and the development of mechanisms to protect against the costs of care seem warranted to ensure access for the urban poor.

**Keywords:** Access to health care; Poverty; Developing countries; India; Urban health services; Private sector; Multilevel analysis

## RÉSUMÉ

Le Kerala - en Inde du sud - présente des indicateurs favorables de développement humain, une forte disponibilité de services publics, et des taux élevés de recours aux soins. Il est souvent cité comme un modèle de *bonne santé à faible coût*. Néanmoins, on y retrouve aussi un secteur de santé privé dont la disponibilité dépasse largement celle du secteur public. Ceci se traduit par un fort recours aux services privés. On connaît peu de chose des inégalités sociales d'accès aux soins - particulièrement dans les régions urbaines - au Kerala.

Notre analyse suggère que les pauvres et les travailleurs du secteur informel présentent plus de barrières à l'accès, comparativement aux populations plus favorisées. Ces deux groupes défavorisés présentent aussi une plus forte propension à recourir aux services publics, malgré des indications que ces services sont moins disponibles et de moins bonne qualité que les services offerts dans le secteur privé. Les populations défavorisées - malgré un moindre accès et une restriction de leur consommation de soins - subissent un plus lourd fardeau économique lié aux soins, particulièrement dans le secteur privé. Au niveau des contextes urbains, la défavorisation urbaine et une densité moindre de l'offre de soins sont associées à une restriction de l'accès. Le secteur public semble jouer un rôle particulier dans la facilitation de l'accès aux soins des populations défavorisées. L'offre de services privés quant à elle - plus élevée dans les zones favorisées et les grandes villes - stimule le recours aux services privés.

Malgré un fort niveau de développement humain, des inégalités socio-économiques d'accès persistent dans les régions urbaines du Kerala. Ces inégalités sont liées à la défavorisation individuelles et à des caractéristiques des environnements urbains. Dans un contexte de vieillissement de la population et de croissance des maladies chroniques, une consolidation de l'offre publique et le développement de mécanismes de protection contre les coûts de la maladie semblent indiqués pour assurer l'accès aux soins pour les pauvres urbains.

**Mots-clés:** Accès aux soins de santé; Pauvreté; Pays en développement; Inde; Santé urbaine; Secteur privé; Analyse multi niveaux

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## LIST OF ABBREVIATIONS

CDS	Centre for Development Studies
CI	Confidence Interval
CNCD	Chronic Non Communicable Diseases
FSU	First-Stage Unit
GDP	Gross Domestic Product
GLM	General Linear Model
GNP	Gross National Product
IMR	Infant Mortality Rate
INR	Indian Rupees
MCMC	Markov Chain Monte Carlo
MPCE	Mean Per capita Consumption Expenditure
MQL	Marginal Quasi Likelihood
NFHS	National Family Health Survey
NGO	Non Governmental Organisation
NSSO	National Sample Survey Organization
NSS	National Sample Survey
OECD	Organisation for Economic Co-operation and Development
OR	Odds Ratio
PHC	Primary Health Centre
PL	Poverty Line
PQL	Penalised Quasi Likelihood
RIGLS	Restricted Iterative Generalized Least Square
SC/ST	Scheduled Caste / Scheduled Tribe
SDP	State Domestic Product
TFR	Total Fertility Rate



**This thesis is dedicated to Vanessa, Félix and Zoë,  
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## FOREWORD

The idea for this thesis emerged out of readings on urban health. These readings - seen in the light of previous personal and professional experiences in the south Indian context - generated my initial questioning about access to health care in the cities of south India. This idea developed with my exposure to the fascinating state of Kerala. Further readings and discussions with scholars from the Centre for Development Studies - a renowned institution located in Trivandrum - helped to pinpoint the focus of this thesis.

Kerala is known for its high level of human development and the good health status of its population, despite being a relatively poor state. At first sight, it seemed that, along with strides towards attaining high levels of literacy and strong public action, access to health care must have played a significant role in this. Various studies developed these ideas. But, it seemed increasingly clear - as research of the literature went on - that the number of original studies on urban Kerala was small and that a systematic assessment of access to health care in urban Kerala had not been done.

In addition, some aspects of the literature on health and health care in Kerala did not seem in line with what seemed to be occurring in Kerala. Various assumptions - often cited in the scientific literature - were contradicted by the available information. Among these assumptions was the idea that the good health and high levels of utilisation of health services found in Kerala were solely due to the development of the public health care system. More than public institutions, it is the number of private health care institutions and its utilisation by the population that was striking. Various studies seemed to overlook the utilisation and related expenditure in the private sector.

Another assumption was that Kerala's population enjoys good health status. High levels of reported morbidity and consumption of health care services quickly challenged this idea in my mind. Good indicators in terms of maternal and child mortality and good coverage and utilisation with regards to child and maternal health services did not seem to be sufficient proxies of universal access to health care.

Finally, a fair portion of the literature dated to the 1970s and 1980s and a reassessment was thus relevant. Given that no such assessment had been done specifically for urban areas - on the contrary, many studies focused solely on rural Kerala - this subject increasingly held my interest.

The opportunity to use the National Sample Survey on Health and Health Care came right at the time when these ideas were formulated. This survey - vastly under exploited - represented a rich data base on which to test some of the hypotheses that were emerging. Drawn on a strong tradition of measurement of living standards and utilisation of government services, this database enabled complex analyses to be done. The limitations inherent in the usage of such secondary data were clearly compensated by vast possibilities.

During various stays in Kerala - some of them of only a few weeks and others lengthier - the ideas shaping this thesis took form. Discussions with scholars and students, seminar and conference presentations and a general curiosity for understanding life in this state of south India have helped me along the way. I hope that this study can in return contribute to the understanding on access to health care in urban areas of south India and possibly translate into health care policy discussions and further studies on access to health care in urban Kerala.

# 1 INTRODUCTION

The world is becoming increasingly urban. Although this process varies across regions, the entire world is facing an increase in both the size of its cities and in the proportion of people living in urban areas. In developed countries this process has almost arrived at its final stage. Most of the urban growth is expected to take place in developing countries during the next decades (United Nations, 2000; Pernia, 1998; Duncan & Auer, 1995).<sup>1</sup>

Generally, urban areas in developing countries present better health indicators and have more health facilities than rural areas. Their populations benefit from higher economic status, better living conditions and opportunities, and better access to health care. However, aggregate indicators mask the variability found within cities (Tanner & Harpham, 1995). The widespread socio-economic inequalities found in urban areas of developing countries create a vast range of living conditions and result in disparities in mortality and morbidity (Vlahov, Galea, Gibble & Freudenberg, 2005; Sclar, Garau & Carolini, 2005). The urban poor are subject to higher morbidity than wealthier urban inhabitants and they are often subject to a worse health status than the rural poor (World Bank, 1999).

The distribution of health resources within cities is unequal and is not necessarily related to health needs (Lorenz & Garner, 1995). Urban health care facilities often benefit only an affluent minority and access to health care is restricted for the poor (Cairncross, Hardoy & Satterthwaite, 1990; WHO, 1993; Rossi-Espagnet, Goldstein & Tabibzadeh, 1991; Harpham & Tanner, 1995; Fosu, 1989). Increasing urbanisation and widening inequalities, unmatched by the development of affordable services and investments in publicly financed services or insurance coverage, could lead to restrictions in access to care particularly among the poor and economically deprived (Castro-Leal, Dayton, Demery & Mehra, 2000; McDade & Adair, 2001; Feachem, 2000).

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<sup>1</sup> Current projections suggest that half of the population of less-developed countries will live in cities by 2017. Asia is one of the least urbanized areas of the world, yet, it already has more urban dwellers (1.5 billion) than Europe, Latin America, North America and Oceania combined (1.2 billion). By 2030, Asia will account for over half of the urban population of the world (United Nations, 2004).

Recent studies have suggested that characteristics of living environments could be significant determinants of access to health care, in addition to characteristics of individuals and the availability of health care services (McDade & Adair, 2001; Ecob & Macintyre, 2000). Intra-urban disparities in access to health care have mostly been studied in large cities (Satterthwaite, 1998). However, a bigger number of the urban population lives in fast-growing smaller cities. Much less is known about access to health care in small and medium towns (United Nations, 2000).<sup>2</sup> Assessments about which urban characteristics influence access to health care - in the context of developing countries - are still lacking.

This thesis has as overall objective to assess the disparities in access to health care found in urban areas. We aim to identify individual and urban factors that facilitate or impede access to health care - especially for the poor, casual workers and members of backward social groups - and assess the economic burden of health care for the urban poor.

### *The focus of the thesis*

Four words can describe the focus of this thesis: *inequalities*; *access*; *deprivation*; and *urbanity*. The first two words relate to our object of analysis, the inequalities in access to health care. We are therefore interested in better understanding disparities in opportunities to utilise health services - in instances of need for care - emerging from barriers to access. The third word - *deprivation* - is central to this thesis. It relates to individual and household conditions - such as economic poverty, casual work employment and belonging to backward castes - of those most at risk of experiencing adverse outcomes associated to illness episodes. The last word - *urbanity* - describes the context under scrutiny, namely the urban environment, and its attributes associated with variations in access to health care. Our objective from the start was to better understand inequalities in access to health care in urban areas of developing countries by looking at the state of Kerala, in south India.

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<sup>2</sup> In 2003, 4% of the world population resided in mega-cities - cities of 10 million inhabitants or more. By 2015 this share is expected to rise to 5%. About 25% of the world population was living in cities with fewer than 500,000 inhabitants in 2003. In south Asia, around 14% of people live in cities of more than 10 million inhabitants, 7% in cities of five to ten million, 16% in cities of one to five millions compared to 55% in towns of fewer than 500,000 inhabitants (United Nations, 2004).

The thesis addresses three broad sets of questions. The first focuses on the role of deprivation on access to health care and the barriers to health care experienced by the urban poor. What are the individual and household characteristics associated with barriers to access to health care in urban Kerala? What are the specific barriers for deprived people?

The second set of questions focuses on assessing variations in access to health care across urban environments and identifying the role of urban attributes and health care sectors on these variations. Does access to health care vary across urban contexts? What are the urban characteristics associated with restrictions in access? What is the role of urban size and other urban attributes? What is the role of public and private urban health systems?

The third set of questions relates to the economic burden of hospital care across social groups and health care sectors. What is the economic burden of hospital care? How much is it a burden for the poor? The combination of available information about urban environments - in addition to individual and household characteristics - to assess disparities in access to health care and its related economic burden - in a joint analysis - is a contribution of this thesis.

The reasons for taking urban Kerala as a case are numerous. First, this state is often described as a model of *good health at low cost* with regards to public investments. We believe that lessons learned from this context could be applicable to other low-resource settings. Second, Kerala is already at an advanced stage of health transition and to this regard, provides a window into the future of other developing countries which have not yet reached this level of transition, but are evolving in this direction. Third, the widespread utilisation of health services in Kerala permits assessment of differentials related to the complete spectrum of determinants of access to health care. Such settings, with a strong *culture of health care consumption* - where poor and non poor seek health care when they experience health problems - and where many options for care are available, offer the possibility to assess the economic barriers and burden related to access to health care. Finally, although the public sector is well-developed, the size of the private sector and the prices of medical goods and services - under the impetus of liberalisation of the economy - have increased in recent decades (Kunhikannan & Aravindan, 2000; World Bank, 2001).

Thus Kerala provides an array of situations by which to assess cumulative barriers in access to health care (from identification of need for care, physical access, available options and related economic burden). In addition - with three principal urban agglomerations with populations ranging between 800 000 and 1.3 millions inhabitants - this context can provide insights into the situation for medium sized and small towns. Kerala has been a model for other Indian states and developing countries with regards to its human development and primary health care approach. Insights from this state could again prove useful for other Indian states or other less-developed countries confronted with similar changes in the future.

This thesis intends to address some aspects that have been relatively overlooked by other studies. Access to health care in urban areas, the role of the private sector, the urban characteristics facilitating or impeding access to health care, and the costs of health care, are among the aspects that we tackle in this study. We aim to better understand disparities in access to health care in urban areas in Kerala and assess the role of poverty - as well as occupational status and caste membership - and of urban environment on these disparities in access to health care. Few studies have looked at the interactions between individual, household, and community level characteristics to explain inequalities in access to health care in urban areas. It is the aim of this thesis to contribute to the knowledge about urban health systems by studying the state of Kerala, in south India.

We present and discuss the results from two analytical perspectives. The **first perspective** focuses on disparities in utilisation of health care services across social groups and utilisation patterns in various urban contexts. The first paper focuses on utilisation of outpatient care services in response to perceived need, and the share of public and private outpatient care utilisation. This perspective further entails an analysis of social disparities in pathways to hospitalisation and sources of hospital care. This is the focus of the second paper. We thus use these disparities in utilisation - controlling for need for care - to reveal problems of access to health care. Our assumptions were that - controlling for the severity and nature of illness - the poor, members of backward castes and casual worker households would face restricted access to care and differential access to public and private sector services. In addition, we expected poorer urban areas, and those with lower availability of



health care services, to show lower access to health care services. Urban wealth and availability of services are also expected to determine choices between the public and private sectors in health care seeking processes.

The **second perspective** deals with financial access to health care services. In the third paper, we assessed the cost of hospitalisation in public and private institutions across income groups. Our assumptions were that deprived groups - mostly the poor and casual worker groups - would report high levels of health expenditure in the private sector compared with expenditure in the public sector. The results presented in this third paper are complemented with an analysis of the economic burden of care across income groups. These will be presented in the last section.

This thesis will proceed in three parts. The first part begins with a description of the context of study in terms of demographic composition, human and economic development and health status indicators. We then review the existing literature on access to health care. It is followed by a review of the conceptualisation of access to health care and the proposal of a conceptual framework. The second part consists of a description of the methodology used in this study and the presentation and discussion of analytic results through the three aforementioned scientific papers. The third part discusses the presented results - linking knowledge generated from each paper and complementary analyses - and concludes with policy and research implications for urban health systems of developing countries.

We feel that this thesis - the first to address the question of access to health care in urban Kerala - contributes to a better understanding of disparities in urban areas. We have tried to make the best use of the most extensive population survey on health care available - a database too often under utilised - to provide insights for decision-makers and social science researchers. We hope that it translates into policy discussions and further research on urban Kerala. This is our modest attempt at understanding a less explored subject in south India.

## 2 LITERATURE REVIEW

In this section, we will review the scientific literature on access to health care in urban Kerala. The first part consists in a description of the context of Kerala. We start with a portrait of its demographic, social, and economic characteristics, a summary of the extent of present knowledge on health status and morbidity. The second part provides an overview of Kerala's health care system and reviews the knowledge on health care utilisation and access to health care in the context of Kerala and in developing countries in general. We finally conclude by identifying some gaps in scientific knowledge about access to health care in urban areas. Throughout this review, an effort is made to systematically position Kerala in relation to India and other south Indian states - namely Tamil Nadu, Karnataka and Andhra Pradesh - and to highlight the extent of knowledge specific to urban areas of developing countries.

### PART 1: THE CONTEXT OF STUDY

#### 2.1 The state of Kerala

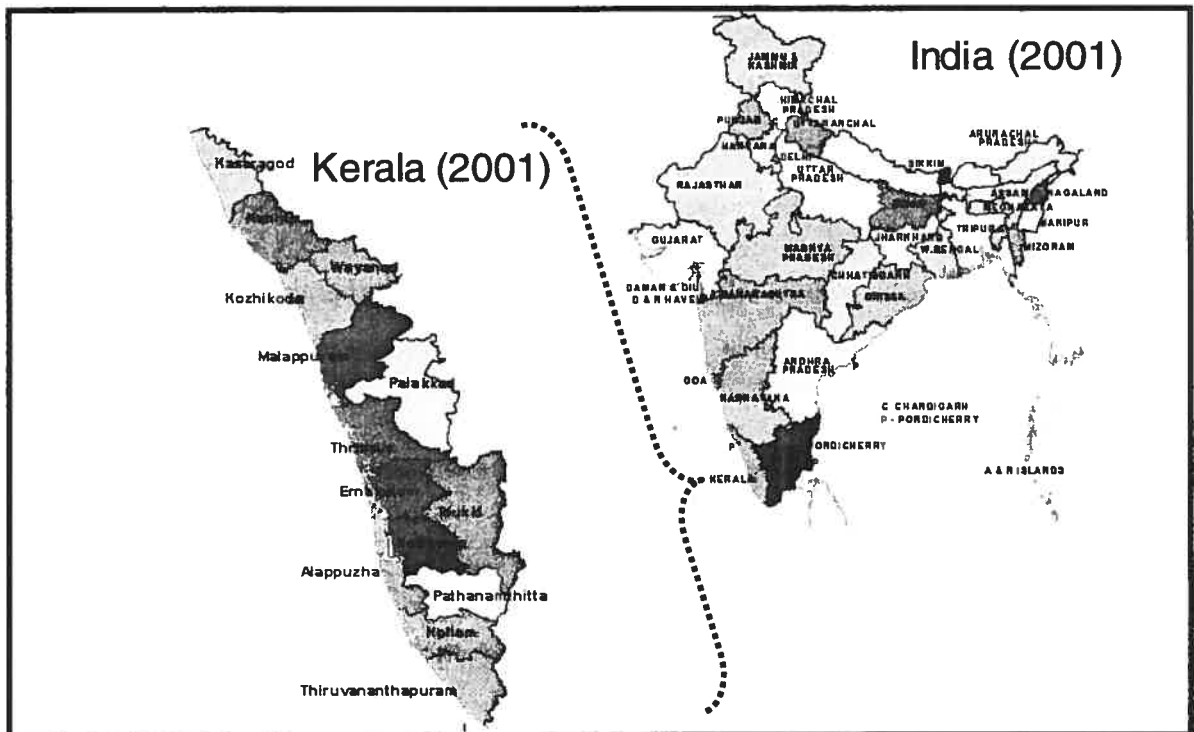
The state of Kerala lies on the southern tip of India between the Arabian Sea and the *Western Ghats* mountain range. It is a small state by size - amounting to only 1.2% of India's territory - and is divided into 14 districts (Figure 2.1). With a population of about 32 million people (3.2% of India's population), it has the highest population density in south India - at 819 persons per square kilometre - and the third highest among major Indian states.

Its population is composed of a majority of Hindus (56.2%) but has an large proportion of Muslims (24.7%) - concentrated in northern districts - and of Christians (19.0%) - concentrated in southern districts. It has lower proportions of people from *scheduled* - groups identified as being socially and economically backward - castes (9.8%) and tribes (1.1%) and is the only state with a sex ratio favouring females (Table 2.1) (Census of India, 2001).

### *The urban environment*

Kerala is characterised by a pattern of urbanisation where medium and small towns have a prominent position<sup>3</sup> (Ramachandran, 1996). Only one urban agglomeration - Kochi/Ernakulam - has more than one million inhabitants. Its three main urban agglomerations are distributed across the state and none represent more than 10% of the states urban population. Its level of urbanisation is of 26% and stands at the level of the Indian average, lower compared to other south Indian states. Its high population density and its scattered model of settlement result in a close proximity between rural and urban areas (Sreekumar, 1993).

**Figure 2.1 India and Kerala political maps**



(Census of India, 2001)

Districts vary with regards to their level of urbanisation. The six districts with a major urban agglomeration have from 28% to 50% of their populations living in urban areas compared to 3% to 19% for the other districts. These highly urbanised districts comprise together nearly

<sup>3</sup> There are 17 urban agglomerations - consisting of towns and their outgrowths - 32 class I towns (>100,000 inhabitants), 32 class II towns (between 50,000 and 99,999 inhabitants) and 184 other towns (Census of India, 2001).

78% of the urban population of the state (Table 2.2). With the exception of Allapuzha, this parallels the clustering of unfavourable social and economic indicators. The least urbanised districts present worse urban indicators compared to highly urbanised districts. In particular, the districts of Ernakulam, Kozhikode and Kannur present favourable indicators - indicated with a [+] in table 2.2. In contrast, the districts of Wayanad, Allapuzha, Kollam and Kasaragod show a clustering of unfavourable indicators. These areas tend to have high levels of scheduled castes, dilapidated houses, houses made of temporary materials, absence of drainage system and a large share of its population with no high value assets.

In addition, only 0.8% of the urban population (around 45,000 people) lives in slums in Kerala, which is the lowest proportion of all Indian states (Census of India, 2001). These settlements usually consist of marginal clusters of habitations built on inhospitable land such as the side of railway tracks, rivers and canals. Kerala's pattern of urbanisation thus differs from other Indian states, where metropolitan cities tend to be larger and account for a bigger share of the urban population and - in addition to the presence of small clusters of informal habitation - comprise large slum areas, concentrating many thousand inhabitants.

Table 2.1 Composition of the population, south Indian states and India

	Population (millions)	Population density (per km <sup>2</sup> )	Level of urbanisation (%)	Scheduled caste population (%)	Sex ratio (females per 1000 males)
Kerala	32	819	26.0	10	1,058
Tamil Nadu	62	480	44.0	19	987
Karnataka	53	276	27.3	16	965
Andhra Pradesh	76	277	34.0	16	978
India	1,029	324	27.8	16	933

Source: Census of India, 2001

Table 2.2 District level indicators from the Census of India 2001, urban Kerala

Districts	Population		Urbanisation level (%)	Scheduled caste population (%)	Condition of houses		Drinking water source Tap (%)	Fuel used for cooking Wood (%)	Having bathroom facilities within the house (%)	Houses made of temporary material (%)	Type of drainage		Type of latrine	No high value assets (%)
	Urban (1000s)	% of urban Kerala			Good (%)	Dilapidated (%)					No drainage (%)	No latrine (%)		
Ernakulam	1,477	18	48	6.8	72 [+]	4 [+]	70 [+]	38 [+]	88 [+]	2 [+]	60 [+]	5 [+]	14 [+]	
Kannur	1,213	15	50	3.8 [+]	69 [+]	3 [+]	9	73	83	2 [+]	67	7	16 [+]	
Kozhikode	1,101	13	38	5.4 [+]	69 [+]	5	24	73	84 [+]	5	73	5 [+]	21	
Thiruvananthapuram	1,092	13	34	9.7	61	8	59 [+]	51	73	20	69	9	21	
Thrissur	839	10	28	8.9	57	6	28	60	89 [+]	7	69	5 [+]	16 [+]	
Allapuzha	621	8	30	5.4	63	9	36	67	57	11	84	12	20	
Kollam	466	6	18	8.3	60	9	30	59	67	15	83	9	27	
Kottayam	300	4	15	5.8	60	5	41	53	78	4 [+]	60 [+]	8	20	
Palakkad	356	4	14	11.9	58	5	58 [+]	50 [+]	74	8	60 [+]	17	21	
Malappuram	356	4	9	7.1	66	4 [+]	25	74	78	6	78	8	27	
Kasaragod	234	3	19	3.8 [+]	63	6	19	62	82	5	77	14	23	
Pathanamthitta	124	2	10	9.2	67	5	32	54	71	4 [+]	68	13	20	
Idukki	58	<1	5	6.3	63	7	41	58	60	7	70	9	19	
Wayanad	30	<1	4	7.6	60	10	32	49 [+]	73	15	64	13	22	

[+] Favourable indicator

### *Human and economic development*

Kerala presents less inequality in various indicators - such as economic status and literacy - between rural and urban areas, males and females, and across socio-economic groups than other Indian states (Drèze & Sen, 2002). Observers have suggested that this is the result of the socialistic orientation of former governments and rulers resulting in land reforms and the establishment of public programs (Panikar & Soman, 1975; Caldwell, Reddy & Caldwell, 1983). The emphasis on primary education has resulted in the achievement of high levels of literacy (Kumar, 1993; Ramachandran, 1996). It is 90% - 94.2% among males and 87.7% among females (Census of India, 2001) within the population aged 7 years or above and specifically reaches 93.2% in urban areas. Kerala also has the highest proportion of 7 to 10 year olds attending school and of persons with a secondary level education or more (Table 2.3). Kerala has a highly literate - and *health literate* population - playing an active role in public affairs and adopting hygienic practices (Shah & Rani, 2003; Kannan, 1999).

Table 2.3 Human development, south Indian states and India

	Literacy rate (%)		School attendance of 7-10 years old (%)	Secondary education and above (per 1000)
	Male	Female		
Kerala	94	88	97.5	335
Tamil Nadu	82	64	87.1	307
Karnataka	76	57	85.1	282
Andhra Pradesh	70	50	85.3	279
India	75.3	54.3	75.4	285

Source: Census of India, 2001

Kerala's economy now mostly relies on the services sector (63.8% of GDP) and agricultural and fishing industries (together 17.2% of GDP) (Government of Kerala, 2004). Its work participation rate of 32% is among the lowest in India: 7% of workers are labourers, 15.8% are agricultural labourers and 3.6% are workers in household industries (Census of India, 2001). Nearly half of the population is dependent on agriculture alone for its income. In urban areas, the proportion of casual workers is high and the proportion of salaried individuals is low (Table 2.4). Unemployment is higher than other states.

Table 2.4 Employment indicators, south Indian states and India.

	Participation rate (%) <sup>1</sup>	Casual worker households (per 1000 households) <sup>2</sup>	Regular wage households (per 1000 households) <sup>2</sup>	Usual principal activity <sup>2</sup> (per 1000 households)		
				Not in labour force	Workers	Unemployed
Kerala	32.3	223	340	639	331	30
Tamil Nadu	44.7	160	411	600	383	17
Karnataka	44.5	204	359	626	362	12
Andhra Pradesh	45.8	144	423	625	353	22
India	39.1	122	406	646	335	19

Source: <sup>1</sup>Census of India 2001; <sup>2</sup>NSSO 2005 for urban areas

This last observation of unemployment and higher casual work employment structure is in line with the portrayal of Kerala as a relatively poor state. Such observations provide the basis for the often cited *good health at low cost* of Kerala (Panikar & Soman, 1975; Franke & Chasin, 1992; Caldwell, Reddy & Caldwell, 1983; Ramachandran, 1996). Per capita net state domestic product figures positioned Kerala below the Indian average in the mid 1990s (Table 2.5). However, Kerala has experienced high economic growth during the last decade (Government of Kerala, 2004). Combined with a low population growth, this translated into a better growth per capita than the Indian average (Chakraborty, 2005).

Table 2.5 Household expenditure indicators, urban areas, south Indian states and India.

	Per capita net SDP (1997-98) (INR)	Average MPCE (INR)	Households below 300 INR (%)	Households above 1925 INR (%)	Gini ratio of MPCE, urban (1999-2000)
Kerala	2,490	1,372	0.6	16.9	0.320
Tamil Nadu	3,141	1,131	2.4	13.4	0.398
Karnataka	2,866	937	3.4	11.9	0.321
Andhra Pradesh	2,550	1,102	2.6	15.8	0.310
India	2,840	1,060	1.9	13.2	0.341

Source: NSSO, 2003

The last assessments of average monthly per capita consumption expenditure (MPCE) position Kerala on top of Indian states. This translates into a lower proportion of households with very low levels of expenditure and a higher proportion of households with high per capita monthly expenditure (Table 2.5). It is also among the states with the lowest measure of inequality - expressed by the Gini coefficient - in MPCE.

Kerala also experienced a significant reduction in poverty during the last three decades. From estimated poverty headcounts of 68% in 1970 - a level at the time much higher than the Indian average - poverty was recently estimated at 20%. With only 6.2% of very poor, it is among the lowest levels of south Indian states, now below the Indian average. This is not to say that poverty is absent in Kerala, one person out of five is still below an already low poverty threshold around 1999-2000 (Table 2.6). According to the latest information, the headcount index is now as low as 13% in Kerala - the third lowest rate among major states - compared to 26% for India (NSSO, 2003).

Table 2.6 Poverty indicators, urban areas, south Indian states and India

	Poverty	Poverty	Poverty headcount		Poverty headcount	
	headcount	headcount	1993-1994 <sup>3</sup>		1999-2000 <sup>3</sup>	
	1970-71 <sup>1</sup>	1983 <sup>2</sup>	Poor	Very poor	Poor	Very poor
Kerala	68.0	45.7	24.6	9.8	20.3	6.2
Tamil Nadu		47.0	39.8	18.2	22.1	7.9
Karnataka		42.8	40.1	21.7	25.3	9.3
Andhra Pradesh		36.3	38.3	16.8	26.6	9.3
India	55.0	40.8	32.4	15.1	23.6	9.2

Source: <sup>1</sup>EPW Foundation (1993) cited in Ramachandran, 1996; <sup>2</sup>Government of India, 2002 (1); <sup>3</sup>Radakrishna, Hanumantha, Rao, Ravi % Reddy, 2004 from NSS data 50<sup>th</sup> and 55<sup>th</sup> round Consumer expenditure



## 2.2 Health status and morbidity in Kerala

The state of Kerala is known for its high achievements in health. Over a few decades, its levels of fertility and mortality have been reduced to lower levels than other Indian states (Franke & Chasin, 1992; Thankappan & Valiathan, 1998; Saradamma, Higginbotham & Nichter, 2000). It has a low crude death rate, and low total fertility rate (TFR) – 1.96 live births expected per woman in her reproductive years, a life expectancy above 73 years (Government of India, 2002 (2)) and an infant mortality rate (IMR) as low as 8 per thousand live births in urban areas (NSSO, 2006). As seen in table 2.7 and 2.8, Kerala also has much lower levels of crude death rate and IMR, which translates into higher life expectancy at birth among both males and females<sup>4</sup> compared to other south Indian states and the Indian average.

In fact, most mortality indicators suggest a better health status in Kerala. It is comparable to many upper middle income countries - such as Argentina and Mauritius (World Bank, 2001). This situation of low mortality and low fertility results in the ageing of Kerala's society. It now has a higher proportion of elderly above 60 years of age - reaching nearly 11% of the urban population - and experiences lower population growth than other states (Table 2.7).

Table 2.7 Demographic and fertility indicators, south Indian states and India.

	Crude death rate (per 1000 persons), urban <sup>1</sup>	Total fertility rate <sup>2</sup>	Decadal growth <sup>2</sup> (%)	Population older than 60 years <sup>3</sup> (%)
Kerala	5.7	1.96	9.4	10.6
Tamil Nadu	8.1	2.19	11.2	7.9
Karnataka	6.9	2.13	17.2	5.9
Andhra Pradesh	7.7	2.25	13.9	5.8
India	7.8	2.85	21.3	6.6

Source: <sup>1</sup>NFHS-2 1999; <sup>2</sup>Census of India 2001; <sup>3</sup>NSSO 2006, Urban sample

<sup>4</sup> A similar favorable position is seen for maternal mortality rate which was 198 per 100 000 live births, in 1998, compared to an all-India average of 407 (Government of India, 2002 (2)).

### Reported morbidity

Paradoxically, morbidity indicators tend to give a contradictory picture of the health status in Kerala. There are high levels of perceived morbidity and high levels of utilisation of health services and hospitalisations (Panikar, 1998; Kannan, Thankappan, Ramankutty & Aravindan, 1991; Kunhikannan & Aravindan, 2000; Soman, Damodaran, Rajasree, Kutty & Vijayakumar, 1991). Kerala has the highest level of ailments reported over a period of two weeks in India. Its reported rate of 100 commencing ailment per 1000 persons in urban areas is twice the incidence reported for the next highest state (NSSO, 2006). Similar results can be seen for hospitalisations, with Kerala presenting much higher rates than other states (Table 2.8).

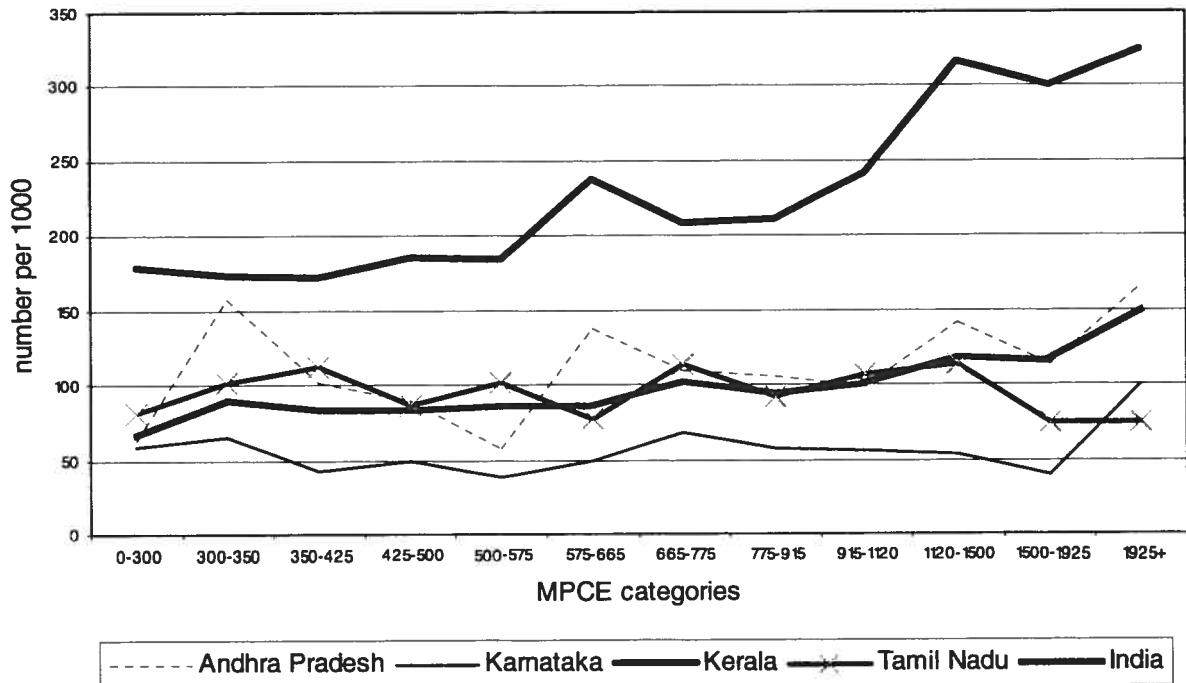
Table 2.8 Mortality and morbidity indicators, south Indian states and India

	Life expectancy at birth (1992-96) <sup>1</sup>		Infant mortality rate (per 1000 live birth) <sup>2</sup>	Hospitalisation rates per 1000 persons, urban (365 days) <sup>3</sup>	Incidence of illness per 1000 persons, urban (last 15 days) <sup>3</sup>
	Male	Female			
Kerala	70.2	75.8	16.3	90	100
Tamil Nadu	62.8	64.8	48.2	37	49
Karnataka	61.1	64.5	51.5	26	20
Andhra Pradesh	60.8	63.0	65.8	28	47
India	60.1	61.4	67.8	31	44

Source: <sup>1</sup>Registrar General of India, 1999; <sup>2</sup>IIPS, 2000; <sup>3</sup>NSSO, 2006

Figure 2.2 shows the rate of reported illnesses among different economic classes. Although all states and India, in general, show a gradient increase in reported morbidity with increasing economic status, it is in Kerala that the highest differential of reporting between richer and poorer individuals is found. Individuals from the highest economic status category report almost twice the morbidity of the poorest category. The levels of reported - or perceived - morbidity are higher in Kerala at every economic level. These are lower in northern Kerala, which is lagging in terms of economic development (Dilip, 2002).

Figure 2.2 Reported illnesses (per 1000), last 15 days by MPCE category in urban areas.



Source: NSSO, 2006

Analyses of secondary population surveys have consistently suggested high levels of reported morbidity in Kerala (Dilip, 2002; Michael & Singh, 2003; Kutty, Soman, Joseph, Pisharody & Vijayakumar, 2000). The extent with which this translates into real morbidity and illnesses remains unclear. Reported morbidity and hospitalisation are influenced by cultural and health system factors - such as supply of hospital beds - and these results should be analysed with caution. Kerala has a health literate population - with high expectations regarding their health - and a strong culture of consumption of health care.

High levels of reported morbidity and hospitalisations could be more the result of biases in reporting ailment and high availability of health care services than real excesses in morbidity (Kumar, 1993; Ramachandran, 1996). In a state where mortality is low, availability of care is high, and hygienic practices are good, one would expect morbidity to be lower and the exact level of morbidity in the population thus remains difficult to assess from the existing literature.

### *Chronic illnesses*

Another potential reason for the high reported morbidity lies in the emergence of chronic illnesses. In the wake of its success in reducing mortality, Kerala faces the coexistence of *diseases of poverty* and *diseases of affluence*, a situation which may be triggered by the ageing of the population and the fact that large numbers of Keralites still belong to lower socio-economic groups (Ramachandran, 1996; Micheal & Singh, 2003; Zacharia, Thankappan, Alex, Sarma & Vasana, 2003; Joseph, Kutty & Soman, 2000; Dilip, 2002). A recent population survey shows that hypertension and heart diseases, diabetes and disorders of joints and bones are four of the five most reported morbidities among the elderly in Kerala - heart diseases and diabetes also being among the main reasons for hospitalisations (Mukherjee & Levesque, 2006). Infectious diseases and trauma still represent the main morbidities among the non-elderly.

Chronic conditions, such as type II diabetes, hypertension and coronary heart diseases are rising in urban areas, alongside risk factors such as obesity, a sedentary lifestyle, elevated serum lipids, and smoking (Kutty, Soman, Joseph, Pisharody & Vijayakumar, 2000; Zacharia, Thankappan, Alex, Sarma & Vasana, 2003; Joseph, Kutty & Soman, 2000). The reported burden of chronic conditions in Kerala is higher among people who are economically well-off than the poor. These groups may be more aware of health issues and therefore be relatively less likely to underreport minor health problems or acute ailments than their counterparts in a poorer economic situation (Dilip, 2002). However, these chronic diseases are not restricted to the richer segments of the population and the poor show high prevalence rates and high rates of complications for many of these conditions (Ramachandran, Snehalatha, Vijay & King, 2002). Chronic illness in Kerala is a less studied area.

## PART TWO: ACCESS TO HEALTH CARE

The previous section highlighted the main characteristics of the State of Kerala. In this part, we will review the literature on access to care and utilisation of health care services in Kerala, with a special focus on urban areas. We will first provide an overview of Kerala's health care system. We will then review the extent of knowledge about seeking and utilisation of health care, and about the impact of availability, costs and quality on access to health care in the context of Kerala and developing countries.

### 2.3 The health care system

Various factors have been put forward to explain the rapid decline in mortality and fertility seen in the state of Kerala highlighted in the previous section. Among these is the development of a health care system that provides the majority of the population with ready access to medical centres, focusing on pregnancy, birth, and the very young (Kumar, 1993; Caldwell, Reddy & Caldwell, 1983). In this section, we briefly review the available literature on the health care system in Kerala with regards to governance, financing, resources and infrastructure. The information is going to be compared to evidence from the literature on urban health systems in developing countries.

#### *Governance and financing*

In India, health is a state responsibility. The provision of health care in the public sector is a shared responsibility between the state, central, and local governments (Purohit, 2001). The central government is mostly responsible for the development and monitoring of national standards and regulations, for the coordination between state governments and international donors, and for the financing and implementation of various programs (Narayana, 2006). State-level governments mostly finance primary health care facilities - such as primary health centres and hospitals. State and local governments account for about three-quarters and the Central government for about a quarter of public spending on health. Local governments have no significant financial authority in India except in some large cities where they administer hospitals (World Bank, 1999).

Total health expenditure in India amounts to 6% of gross domestic product. The public part of this expenditure - state and central level combined - has been comparatively low. The States' resources allocated to the health sector have been declining since the 1990s (Government of India, 2002 (1)). These have declined from 7.0% to 5.5% as a proportion of governmental spending and from 1.3 % to 0.9% as a proportion of GDP from 1990 to 1999 (Garg & Karan, 2005). Compared to an average of 2.8% of GDP for developing countries, this is among the lowest level of health expenditures by any government in the world (Bhat & Jain, 2004). India is among the bottom 20 percent of countries with regards to the level of public spending in health (World Bank, 2001; Bhat & Jain, 2004). Only about 17% of the aggregate expenditure is provided by the public sector. This level of public contribution to health is low compared to other Asian countries such as Sri Lanka (49%), Bangladesh (44%) Thailand (57%) (Bhat & Jain, 2004).

The current annual per capita public health expenditure in the country is no more than 200 INR - approximately 4.3 US \$ (Government of India, 2002 (1)). About one-third of this expenditure is spent on secondary and tertiary in-patient care, the rest allocated to the curative needs at the primary care level (Bhat, 1999). Most of the health expenditure - 82% - is out-of-pocket (Deogaonkar, 2004). Insurance coverage mechanisms are negligible and most of the private health expenditure is out-of-pocket (Bhat, 1999). Currently, only about 10% of the population is protected under any health insurance coverage<sup>5</sup>, and most of those insured belong to the organized sector (Gumber, 2001; World Bank, 1999; Varkey, 2003). Out-of-pocket expenditures represent approximately 97% of private health expenditure, only 3% is covered by some form of insurance (Garg & Karan, 2005).

In Kerala, the per capita government health expenditure has been among the highest of any Indian state (Garg, 1998). The annual growth rate of government health expenditure was outstripping the growth of state domestic product during the three decades after the

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<sup>5</sup> Four types of insurance scheme are present in India: **mandatory** insurance (Employees State Insurance Scheme (ESIS); Central Government Health Scheme (CGHS)); **voluntary** insurance (for individuals and corporations: General Insurance Corporation (GIC) a government owned monopoly); **employer-based** insurance (offered by both the public and private sector, workers buy insurance in lieu of wages); **NGO-based** insurance (primarily for informal sector) (Ranson, 2002).

inception of the public health system (Kutty, 2000). Although it spends more on health care per capita than other states, Kerala's contribution has diminished. Health expenditure fell from 9.6% to 5.5% as a share of government expenditure from 1980 to 1999. As a proportion of GDP, public spending decreased by 50% during the same period and by 35% in the 1990s alone (Table 2.9). Other south Indian states have tended to increase the proportion of public spending on health relative to total spending and have seen lower reductions in spending on health as a share of GDP. This places Kerala - along with other south Indian states - among those with the highest reduction in public contribution and the highest rise in private funding for health care (Bhat & Jain, 2004). This is happening at a time when the cost of hospital care is increasing at a higher rate than the index of general commodities due to application of more expensive technologies to medical care (Varatharajan, Sadanandan, Thankappan & Mohan Nair, 2002). This suggests that the current public contribution to health in Kerala is lower than in other south Indian states.

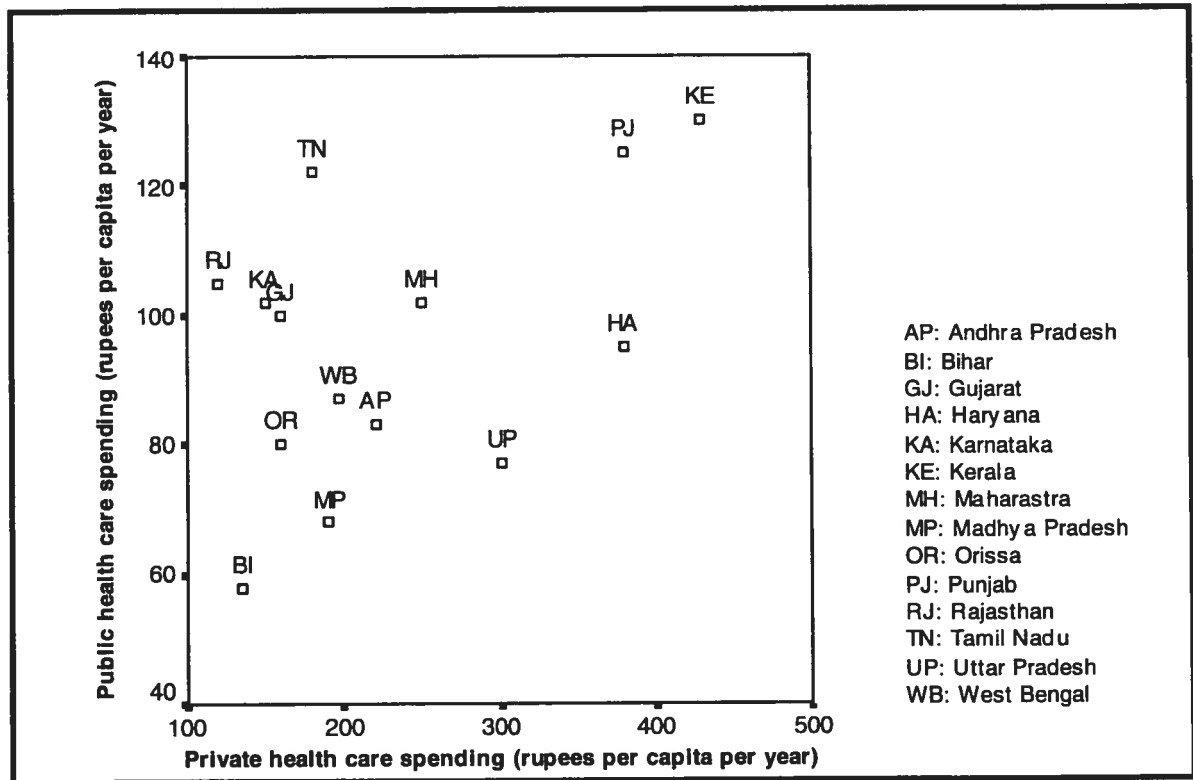
Table 2.9 Public spending on health, south Indian states and India

	Health expenditure ratio (related to total public spending)			Public spending on health as a share of State Domestic Product (SDP)		
	1980-81	1990-91	1998-99	1980-81	1990-91	1998-99
Kerala	9.57	6.76	5.47	2.02	1.49	0.95
Tamil Nadu	6.56	9.44	8.32	1.50	1.94	1.35
Karnataka	5.48	6.42	6.02	1.19	1.32	1.01
Andhra Pradesh	7.63	5.17	8.45	1.44	0.99	1.61
India	7.1	5.88	5.78			

Source: Government of India, 2002 (1)

Despite this, Kerala was still the state with the highest per capita expenditure on health both in terms of public and private contributions in 1995-96 (World Bank, 2001). This is shown in figure 2.3 where Indian states are ranked according to their level of per capita expenditure. From this graph we can also see that, in terms of the share in public expenditure on health, Kerala is in line with Indian levels, its private health spending per capita being roughly 4 times higher than its public health spending per capita.

**Figure 2.3 Comparison of states by public and private health spending, 1995-96**



In the context of such low levels of health insurance described above, most private health expenditure happens in the form of out-of-pocket expenditure. This is the most common form of health financing in the poorest of developing countries (Sekhri & Savedoff, 2005). These countries often face difficulties in mobilizing resources and in using existing resources efficiently and equitably. However, financing health care through out-of-pocket payments can create barriers to access to health care or a significant economic burden for the poor and other vulnerable groups (Xu, Evans, Kawabata, Zeramdini, Klavus & Murray, 2003; James, Hanson, McPake, Balabanova, Gwatkin, Hopwood et al., 2006).

#### *Availability of health care infrastructure and human resources*

Kerala has a long history of organized health services. Some of the government hospitals in the state are about 150 years old (Varatharajan, Sadanandan, Thankappan & Mohan Nair, 2002). The foundation for a medical care system was already well established by the time of the state formation in 1956. The period that followed was characterized by the expansion of government health services up until the early 1980s and by a stabilisation of investments



in government infrastructure thereafter (Kutty, 2000). Kerala's highly developed public health system now includes over 6000 health care institutions - defined as an establishment where patients are examined or diagnosed for diseases and where medical treatment is prescribed and provided. These include institutions from allopathic, *ayurvedic* and homeopathic systems of medicine.<sup>6</sup>

The allopathic sector comprises Medical Colleges, District and local hospitals and Primary Health Centres (PHC) and sub centers (Varatharajan, Sadanandan, Thankappan & Mohan Nair, 2002). Medical Colleges are dispersed over the state and each district has a District Hospital - where specialized curative care is provided - and numerous sub district hospitals. In rural areas, the Primary Health Centre is the basic medical institution - a type of institution which is virtually absent in urban areas (Ramachandran, 1996). Institutions dedicated to the care for women and children, and others for infectious diseases, such as tuberculosis and leprosy, complete the health infrastructure. Around 20% of institutions and 40% of hospital beds are found in urban areas (Narayana & Hari Kurup, 2000). About 40% of the government allopathic doctors work in the Medical Colleges (Varatharajan, Sadanandan, Thankappan & Mohan Nair, 2002). Kerala has the highest density of medical facilities in India. Table 2.10 describes the composition of the public health care system and population coverage in Kerala.

Table 2.10 Public allopathic care infrastructure, Kerala

		Institutions	Population covered	Beds
Public allopathic institutions	Medical colleges	6	Variable	≈8,000
	District hospitals	11	0.67 to 3.1 millions	≈31,900
	Hospitals	143	200,000 for taluk hospitals	
	Community health centres	105	230,000	≈4,400
	Primary health centres	943	25,000	≈5,200
	Sub centres	5094	Variable	

Source: Varatharajan, Sadanandan, Thankappan & Mohan Nair, 2002

<sup>6</sup> *Ayurvedic* and homeopathy are traditional systems of medicine. They are highly developed with their own systems of education and provision of health services. There are 690 *ayurvedic* and 415 homeopathic institutions. Of the doctors in the government sector, 22% work in the Ayurvedic and Homeopathic systems.

There are more than 300 hospital beds per 100 000 population in Kerala, which is probably one of the highest ratios in the developing world (Kutty, 2000; Bhat, 1999; Government of India, 2002 (1)). This translates into a ratio of 325 persons per hospital beds, a much lower ratio than any other states (Table 2.11). However, there is heterogeneity in the density of medical institutions and beds across districts. The total density of institutions - and of government institutions - is higher in southern districts (Narayana, 2006).

Table 2.11 Availability of hospital beds, south Indian states and India, 2004.

	Population per hospital beds	Proportion of beds in public hospitals (%)
Kerala	325	31
Tamil Nadu	1135	78
Karnataka	1319	74
Andhra Pradesh	1057	40
India	1503	62

Source: NSSO, 2006

As stated in introduction, urban areas of developing countries tend to concentrate health care infrastructure, especially hospitals. But the distribution of these resources within cities is often unequal and their location not necessarily related to the level of health care needs of communities (Lorenz & Garner, 1995; Harpham & Tanner, 1995; Vlahov, Galea, Gibble & Freudenberg, 2005). A previous study in south India suggested that the centralization of public and private health services generated a diminishing accessibility of health infrastructure in peripheral less formalised living areas of cities (Kumaran & Suseela, 1989). Poor populations often live in such informal settlements at the margin of the urban core and could thus face barriers to access health care services (Cairncross, Hardoy & Satterthwaite, 1990; Mahal, Yazbeck, Peters & Ramana, 2001).

Although density of infrastructure is high in Kerala, variations in availability of beds and institutions are present between districts and the actual distribution inside cities has not been documented. Specific urban areas might show a relative lack of public or private health care infrastructure.

*The public and private sector of health care*

Over the past four decades, the health system has become a complex infrastructure in Kerala. It is now a mix of public and privately-owned facilities (Narayana, 2001). There are marked differences in provider qualifications with the coexistence of not-for-profit (e.g. voluntary health programmes, charitable institutions, missions, and trusts) and for-profit institutions (e.g. general practitioners, private hospitals and dispensaries, and registered medical practitioners), as well as a large informal sector (e.g. practitioners without formal training, faith healers, herbalists) (Bhat, 1993). The private sector's models of practice range from solo practices, nursing homes, to larger corporate hospitals (World Bank, 2001).

The public sector has not kept up with the growing demand for health care in recent years (Kumar, 1993; Nabae, 2003). Concerns over its capacity to address the needs of the ageing population have been raised (Sureshkumar & Rajagopal, 1996; Bollini, Venkateshwara & Sureshkumar, 2004; Purohit, 2001). Concurrently, there was a considerable growth in private facilities, private beds and in the number of doctors working in the private sector, to the extent that these now outstrip government facilities in number.<sup>7</sup> The proportion of beds in the private sector is by far the highest in Kerala (Table 2.11). With regards to hospital beds, the private sector grew by 37.7% compared to 5.5% in the public sector (Table 2.12). Many factors could have facilitated this growth of the private sector. These include changes in social and economic factors - such as increasing per capita income and literacy - within a context of minimal barriers and regulations to opening of private hospitals (Kutty, 2000).

This growth of the private sector along with difficulties of the public system to meet the needs of populations echoes the situation in other developing countries (Russell, 1996; Mehrotra & Jarret, 2002). Public institutions are often minor providers of health care (Thaver, Harpham, McPake & Garner, 1998; Mills, Brugha, Hanson & McPake, 2002). This is also true in India, where the government has never been a major source of outpatient care, despite its role in providing preventive and public health services (Berman, 2000).

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<sup>7</sup> The public sector now represents only 17.4% of institutions, 40.1% of beds and 13.6% of doctors. The private sector is prominent as it concentrates the large majority of the State's doctors (86%), hospitals (82%) and hospital beds (58%) (Kutty, 2000; Varatharajan, Thankappan & Mohan Nair, 2002; Nabae 2003).

Table 2.12 Private health care infrastructure growth, Kerala

	Number of private institutions		% growth in the private sector
	1986	1995	
Institutions with beds	1,864	1,958	5.0
Number of beds	49,030	67,517	37.7
Institutions without beds	1,701	2,339	37.0
Doctors	6,345	10,338	63.7

Source: Kutty, 2000

In Kerala, out of the 12 618 private medical institutions, 33% are in the allopathic, 39% in the ayurvedic, and 25% in the homeopathic systems (Government of Kerala, 1995, 1996). Most private clinics have small adjacent inpatient wards where outpatient and inpatient units are often integrated. The majority of private hospitals are under-10 bed facilities and are usually owned by a practicing doctor. Of the 70 924 hospital beds in the private sector, 95% are in the allopathic system. Private beds are not distributed evenly: 50% of all private beds located are in the districts of Ernakulam, Kollam, Kottayam and Thrissur compared to less than 25% in the six northern districts. The density of private medical institutions is higher in Kozhikode and regions surrounding the economic capital of Kochi/Ernakulam (Narayana, 2006). The density of beds in the private sector has a high correlation with literacy and per capita income in the district, which are associated with growth in the demand for health care (Kutty, 2000).

#### 2.4 Health care seeking and utilisation

Various factors influence the utilisation of health care services and choices of sources of health care in developing countries. These factors relate to characteristics of individuals, households and living environments. Individual and household characteristics such as attitudes towards health care, stigmatisation related to illness or seeking health care, perception of severity of illness, ability to pay for health care, autonomy and distance from health care facilities have been identified as determining the health care seeking process in various contexts (cf. conceptual framework for further discussion of the issue). In addition, cultural and social barriers related to gender or group belonging can act as deterrents from

seeking health care if the services are not deemed acceptable. As an example, long working hours and limited social networks have been shown to reduce women's capacity to seek care in urban areas (Rossi-Espagnet, Goldstein & Tabibzadeh, 1991; Claeson, Bos, Mawji & Pathmanathan, 2000).

At the health care organisation level, the price of services, the quality of available services, and the existence of various options for care are among important factors determining health care seeking and choices of source of health care (Russell, 1996; NoorAli, Luby & Rahbar, 1999; Hodgkin, 1996; Poland, Taylor & Hayes, 1990). Area level factors have been identified as determinants of access to health care and sources of health care in urban areas of developing countries (Fosu, 1989). Some recent studies have emphasized the potential impact of contextual factors - such as economic status at the community level - on access to health care services (McDade & Adair, 2001; Ecob & Macintyre, 2000; Duncan, Jones & Moon, 1996; Curtis & Jones, 1998).

#### *Health care seeking and unmet needs for care*

Kerala's public health system is characterised by its outreach activities using primary health care workers to promote access to maternal and child care services (Padmadas, Kumar, Nair & Kumari, 2000). As a result of this, Kerala has the highest proportion of women receiving antenatal care, of medically supervised deliveries, and of child immunisation in India (nearly 100%) (IIPS, 2000; Nair & Varughese, 1994) (Table 2.13). It is also known for its high levels of utilisation of outpatient care services - including all health care services provided on an ambulatory basis. Up to 90% of persons reporting an ailment receive medical services in urban Kerala, a proportion similar to other south Indian states and the Indian average (Table 2.14).

Given the higher rates of reporting of morbidity that we have seen in the second section of the literature review, it could be suggested that utilisation rates of medical care are much higher in urban Kerala compared to other states. However, the poor, less educated, and low status occupation individuals experience barriers to medical care and, in situations of need, they more often refrain from using them (Krishnan, 2000; Pillai, Williams, Glick, Polsky,

Berlin & Lowe, 2003; Gupta & Datta, 2003) and report higher rates of self-medication (Saradamma, Higginbotham & Nichter, 2000).

Table 2.13 Utilisation of health services, urban areas, south Indian states and India

	Women availing antenatal care services <sup>1</sup> (per 1000)	Medically supervised deliveries <sup>2</sup> (%)	Children 0-4 years receiving immunization <sup>1</sup> (%)
Kerala	976	96.6	96
Tamil Nadu	986	76.3	96
Karnataka	920	52.5	97
Andhra Pradesh	925	54.0	96
India	836	35.0	94

Source: <sup>1</sup>NSSO, 2006; <sup>2</sup>IIPS, 2000

Kerala has the highest rate of hospitalisation in India, with 90 hospitalisations per 1000 population during the last 365 days in urban areas (NSSO, 2006) (Table 2.14). Hospitalisation rates increase with economic status. However, the poor are more likely to be hospitalised in Kerala than in other states (World Bank, 2001).

Table 2.14 Hospitalisation and outpatient care, south Indian states and India, 2004.

	Ailments receiving outpatient care (%)	Outpatient care received from public sector, urban (%)	Hospitalisations in the public sector, urban (%)	Annual hospitalisation rates (per 1000)
Kerala	90	22	35	90
Tamil Nadu	87	22	37	37
Karnataka	87	16	29	26
Andhra Pradesh	88	20	36	28
India	89	19	38	31

Source: NSSO, 2006

In Kerala, consumption of pharmaceuticals is high. A household survey found that 69% of families and 21% of individuals had taken pharmaceutical products over the previous 14 days (Saradamma, Higginbotham & Nichter, 2000). The major source (82%) for drugs was

private pharmacies or medical shops. This study estimated the incidence of self-medication - buying of drugs without medical consultation - at 5 per thousand persons in a two-week period.

Self-medication is common in developing countries general. A fair proportion of health care is carried out by families within the home or by self-medicating through the purchase of over-the-counter medicines instead of seeking the formal health care system (Clewer & Perkins, 1998). This phenomenon of self-medication often results from the lack of financial means to pay for health care (Atkinson, Ngwengwe & Macwan'gi, 1999; Fosu, 1989). This is especially acute for poor households which - whilst showing similar level of recourse to health care - are more likely to seek treatment from drug stores. As much as 25% of individuals from the lowest quintile households resorted to drug store for treatment compared to 18% for the highest quintile (Pannarunothai & Mills, 1997). The urban poor's reliance on pharmacists and traditional practitioners has also been linked to the relative lack of primary health care resources in developing world cities (Harpham, Vaughn & Rifkin, 1985).

#### *Public and private sources of health care*

Studies show that urban dwellers turn to a variety of modern and traditional sources for care, even informal providers, in both public and private sectors (Salem & Fournet, 2003). But public institutions - especially urban primary health care centres - remain underused in many developing countries (Haddad, Nougara & Fournier, 2006). Poverty has been linked with higher utilisation of public sectors' services in case of illness in developing countries (Pannarunothai & Mills, 1997; Castro-Leal, Dayton, Demery & Mehra, 2000; Ha, Berman & Larsen, 2002). But many studies have shown that utilisation of paying private services - although often from informal or ill-qualified private providers - is high even for poor populations (Kannan, Thankappan, Ramankutty & Aravindan, 1991; Zacharia, Thankappan, Alex, Sarma et al., 2003; IIPS, 2000; Zwi, Brugha & Smith, 2001; Paphassarang, Philavong, Boupha & Blas, 2002; Pannarunothai & Mills, 1997). In addition, various studies have suggested that the bypassing of primary health care institutions - related to perceptions of better availability of drugs and cheaper services in hospital

departments - leads to *overuse* and congestion of hospital outpatient departments (Atkinson, Ngwengwe & Macwan'gi, 1999; Pepperall, Garner, Fox-Rushby, Moji & Harpham, 1995; Holdsworth, Garner & Harphan, 1993). Studies have suggested a clear inverse gradient between income quintiles and share of public as a source of hospitalisation: the richer turn massively to private hospitals for care while the poor turn in higher proportions to public hospitals (Pannarunothai & Mills, 1997). At the same time, it is suggested that people with more severe illnesses rely more on public services (Ha, Berman & Larsen, 2002).

The underutilisation of public services reported in developing countries also applies in Kerala. The proportion of ailments treated in public outpatient care facilities has fallen drastically in urban Kerala from 33% in 1986-87 to 28% in 1995-96 and 22% in 2004 (NSSO 2006). It is the only state to have seen such a fall in public sector consultation for outpatient care (NSSO, 2006). Utilisation of private services has thus reached considerable levels in Kerala, even among the poor (Kannan, Thankappan, Raman Kutty & Aravindan, 1991; Krishnan, 2000; Kunhikanan & Aravindan, 2000), especially for outpatient care services (Mahal, Yazbeck, Peters & Ramana, 2001). For hospitalisations, the proportion of public utilisation is slightly higher at 35% (Table 2.14). The poor utilise the public sector services roughly equivalent of their share in population (Mahal, Yazbeck, Peters & Ramana, 2001). The same study suggests that the proportion of hospitalisations occurring in the public sector ranges from 61% among the poorest quintiles to 33% in the richest quintiles in India. The equivalent proportions for Kerala are of 59% and 30% respectively. The disparities in public and private utilisation across social groups remain to be assessed in urban areas of south India. Our review found no studies of the determinants of utilisation of health care and choices between providers in urban Kerala.

## **2.5 The cost of health care**

Economic access to health care is an important determinant for seeking formal health care services and of choices among the various options for care in the urban context. In fact, availability of health services and distance between potential users and the health providers seems to play a lesser - although not inexistant - role in cities of developing countries



(Lorenz & Garner, 1995; Harpham & Tanner, 1995; Vlahov, Galea, Gible & Freudenberg, 2005). Location of health facilities relative to the population of potential users seems related more to the ability to pay for direct and indirect costs of care and to the perceived quality of services in available resources. In this section, we review the knowledge about the cost of health care and its impact on households' decisions and living standards.

### *Household health care expenditure*

As was stated in the review of governance and financing for health care, out-of-pocket expenditure is the most common form of health care financing in India, as in many other developing countries. Households face several different costs related to illness and access to health care. Services in the private sector are given in exchange of up-front payment. Public services also often entail user fees for various aspects of care and outpatient treatments most often have to be paid out-of-pocket. Indirect costs such as transportation, lodging and loss of household income due to absence from work are also important - especially for the poor and casual labour households; these can vary according to the type of institution consulted (Castro-Leal, Dayton, Demery & Mehra, 2000; Seager, 1995; Fosu, 1989; Abel-Smith & Rawal, 1992). Informal or illegal fees - in the form of bribes or services fees - are also seen in developing countries (McPake, Asiimwe, Mwesigye, Ofumbi, et al., 1999; Ensor & Witter, 2001; Chiu, Smith, Morlock & Wissow, 2007; Ensor, 2004; Killingsworth, Hossain, Hedrick-Wong, Thomas, et al., 1999). Various factors have been identified as contributing to high health care costs in developing countries. Among these, poor availability or quality of public sector services and user charges are important to consider (Russell, 2004; Gao, Tang, Tolhurst & Rao, 2001).

Payment for health care services is expected for utilisation of private services; however the literature suggests that it is also very common in public institutions, even for the poor. In theory, health care provided by public institutions should be free for the poor. Studies have shown that this is far from the reality. Payment is asked for various services and health care expenditure has to be made outside of public institutions to compensate for lack of availability of drugs and health supplies, or because of improper waiving of user fees for the poor (Ranson, 2002; Abel-Smith & Rawal, 1992; Hotchkiss & Gordillo, 1999; Khan,

2005; Kadir, Khan, Sadruddin & Luby, 2000). Some studies have suggested that public sector hospitalisation can represent higher average expenditure than some types of private providers, such as those from the non-for-profit sector (Abel-Smith & Rawal, 1992; Hotchkiss, Rous, Karmacharya & Sangraula, 1998). Other studies indicate that private sector services tend to be much more expensive than public sector services (Hotchkiss & Gordillo, 1999). This situation is prevalent in India where, despite being lower for the poor, out-of-pocket expenditures occur in both public and private sectors for all income groups (Mahal, Yazbeck, Peters & Ramana, 2001).

The international literature suggests that the introduction of user fees in public sectors in developing countries had an impact of the utilisation of services by populations. Many studies suggest that, in general, user fees deterred utilisation of both outpatient and inpatient health care services (Palmer, Mueller, Gilson, Mills & Haines, 2004; Creese, 1991; Osuga & Nordberg, 1993; Mwabu, Mwanzia & Liambila, 1995; Haddad & Fournier, 1995; Wilkinson, Gouws, Sach & Karim, 2001). User fees reduce utilisation of health care services disproportionately for the poor, create delays in accessing care and enhance inequities (Mbugua, Bloom & Segall, 1995; Creese, 1991; McPake, Hanson & Mills, 1993; Gilson & Mills, 1995; Huber, 1993; Blas & Limbambala, 2001). They can also have a negative impact on adherence to treatments (James, Hanson, McPake, Balabanova, Gwatkin, Hopwood et al., 2006). Difficulties in the application of exemptions for poor populations have also been reported (Gilson, 1997; Russell & Gilson, 1997; Fabricant, Kamara & Mills, 1999; Ensor & San, 1996; Amone, Asio, Cattaneo, Kweyatulira & Macaluso, 2005).

However, various studies suggest that the negative impact of user fees in government institutions can be partially or completely offset if they are accompanied by increases in supply of drugs, and in the technical and interpersonal quality of services (James, Hanson, McPake, Balabanova, Gwatkin, Hopwood et al., 2006; Akashi, Yamada, Huot, Kanal & Sugimoto, 2004; Haddad & Fournier, 1995; Diop, Yazbeck & Bitran, 1995). In fact, raising the quality of public health services has been associated with increase in utilisation, especially among lower income groups (Litvack & Bodart, 1993; Audibert, Mathonnat & de Roodenbeke, 2000).

Over the last two decades, health care costs, especially for private services, have increased significantly in India (Purohit, 2001; Dilip, 2000; Bhat, 1999; Bhat & Jain, 2004). Comparison of NSS data 1986-87 and 1995-96 suggests that the cost of inpatient and outpatient care grew annually at 26-31% and 15-16% respectively (Gumber, 2001). In urban areas, this increase was particularly high for private hospitalisations - 216% increase in 10 years - compared to urban public hospitalisations (NSSO, 2006). This rise in cost of health care was high in Kerala (Kunhikannan and Aravindan, 2000). A specific look at expenditure for drugs, medical fees and other expenditure (Table 2.15) suggests a sharp increase in health expenditure, ranging between 475% and 539% between 1986 and 1995.

Table 2.15 Health care expenditure growth, Kerala.

	1986	1995	% growth
Drugs	44.20	232.36	539
Medical fees	15.60	99.06	535
Other expenditure	29.12	167.44	475
Total health care expenditure	88.92	548.86	517

Source: Kunhikannan & Aravindan, 2000

However, expenditure for both hospitalisations and outpatient care per episodes tends to be lower in Kerala (Table 2.16). This corresponds with other studies which have suggested that Keralites pay less for treatment both in government and private hospitals (Krishnan, 2000; Saradamma, Higginbotham & Nichter, 2000). In public sector hospitals, only households with incomes below the poverty line are entitled to free services and user fees are required from non poor users (Kutty, 2000). Medical expenditure - including expenditure for medical services, drugs and medical appliances - is lower in the private sector in Kerala, but higher in the public sector compared with other south Indian states (Table 2.16).

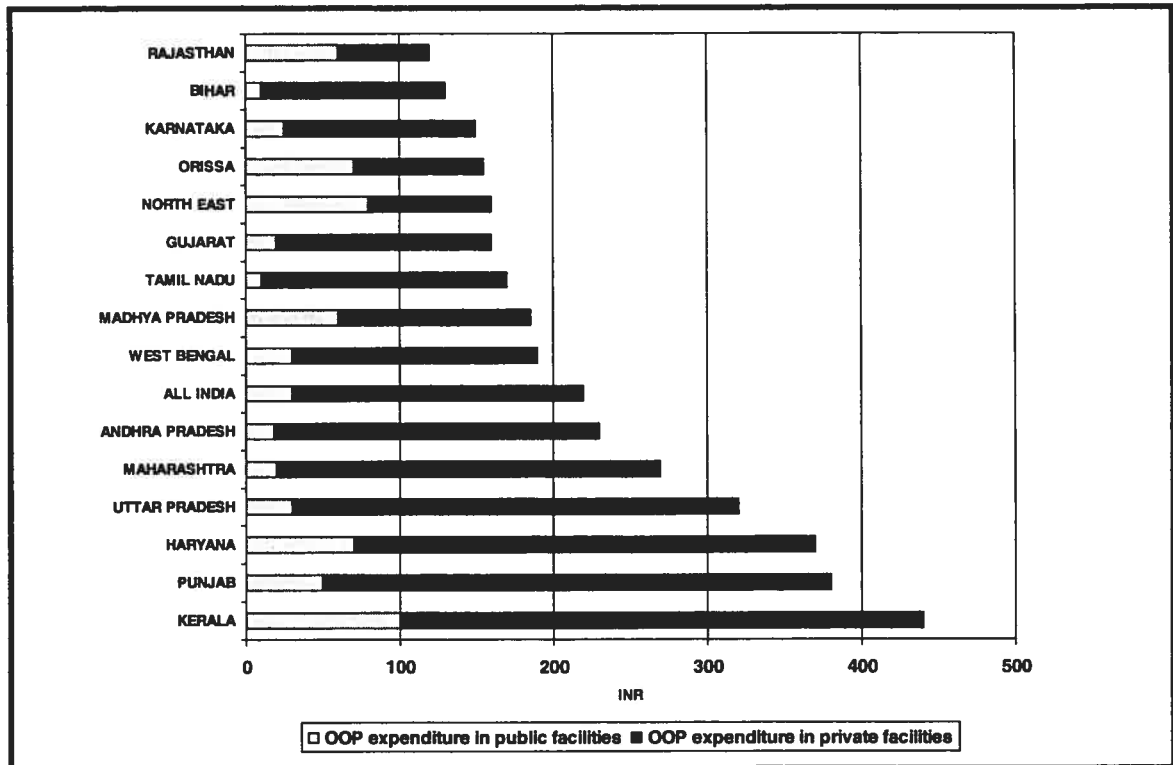
Despite these lower costs for outpatient care services and hospitalisations per episode, Kerala is the state with the highest level of out-of-pocket health care expenditure per capita in both the public and private sectors in India (cf. figure 2.3) (World Bank, 2001). This could result from the high levels of utilisation seen in this state.

Table 2.16 Health care expenditure, urban areas, south Indian states and India, 2004.

	Total expenditure for outpatient care (INR)	Medical expenditure per hospitalisation (INR)		Total expenditure per hospitalisation (INR)
		Public	Private	
Kerala	325	2600	6179	5201
Tamil Nadu	1135	1666	15680	11306
Karnataka	1319	1660	9837	7990
Andhra Pradesh	1057	1450	13036	10085
India	1503	3877	11533	9367

Source: NSSO, 2006

Figure 2.4 Out-of-pocket health care expenditure by state, NSS, 1995-96



### *Ability to pay for health care*

Access to health care is often constrained by the population's ability to pay for health care (Haddad, Nougara & Fournier, 2006). People's ability to pay (ATP) for health care, or the affordability of health care, is a critical health policy issue in developing countries for poor

households or those at risk of becoming poor because of the economic burden related to health care consumption (Russell, 1996). Various studies have shown that the amount of care consumed in cases of illness is related to the household economic status or capacity to mobilize resources (Pannarunothai & Mills, 1997; Ensor & San, 1996; Weaver, 1995; Creese, 1991). In addition to reducing the amount of care consumed, the poor generally delay seeking health care - especially outpatient care - or turn to self-treatment (Ensor & San, 1996; Weaver, 1995).

In developing countries, the perceived need for health care services often exceeds the households' ability to pay. In order to pay for these services, households mostly use savings or sell consumables, but also sell assets and borrow money (Van Damme, Van Lemput, Por, Hardeman et al., 2004). This is especially the case for the poor who, if they are not deterred from using health services, often reduce their consumption of essential goods - such as food and education - as well as selling assets or borrowing to pay for care (Yoder, 1989; Ensor & San, 1996; Mehrotra and Jarret 2002; Russell, 1996; Kawabata, Xu & Carrin, 2002; Ranson, 2002; McPake, Hanson & Mills, 1993). Borrowing often occurs at very high interest rates, especially for the poor, because of the higher economic risks involved in lending money to households with limited income (Khan, 2005; Amone, Asio, Cattaneo, Kweyatulira & Macaluso, 2005; Van Damme, Van Lemput, Por, Hardeman et al., 2004).

Looking at the distribution of spending among Indian states, previous analyses of NSS data suggested that Kerala is the least unequal state, having a fairly even distribution of out-of-pocket spending across income groups (World Bank, 2001; Mahal, Yazbeck, Peters & Ramana, 2001). However, other studies - analysing public and private expenditures - suggest that the health system favours the rich and that recent increases in expenditures have been much higher for the poor (Kutty, 1989; Kunhikannan & Aravindan, 2000).

In urban areas in India, poorer households had to borrow more, on average, than richer households to pay for outpatient care services (NSSO, 2006). More than 40% of hospitalised patients have to borrow money or sell household assets to meet health expenses, and an average of 24% are impoverished in the process in both the public and

private sectors (Peters, Rao & Ramana, 2004). In India, the poorest 20% of households have to borrow money more frequently (45% of households) than the richest quintile (29%) and are less able to use savings (16% and 30% respectively ) (World Bank, 2001).

Various studies have shown that health care expenditure - especially in cases of hospitalisations - can represent a very high proportion of the households' yearly income (Nahar & Costello, 1998; Khan, 2005). Some studies suggest that the poor spend more in proportion of their income on health care than wealthier individuals (Fabricant, Kamara & Mills, 1999; Mehrotra & Jarret, 2002). Others have suggested that the proportion of income spent on health care increases with income (Hotchkiss, Rous, Karmacharya & Sangraula, 1998).

In India, lower income households, when compared to their wealthier counterparts, spend higher proportions of income on health care, up to 8% of their annual income, have to borrow to meet the health care expenses, and often experience catastrophic health expenditure (Garg, 1998; Ramaiah, Guyatt, Ramu, Vanamail Pani & Das, 1999; Ranson, 2002; Bhatia & Cleland, 2001).

#### *Health-related impoverishment and catastrophic health expenditure*

Health care expenditure can have an important impact on the living standard of households in developing countries, especially poor households (Gertler & Gruber 2002; Uplekar, Pathania & Raviglione, 2001). With the precarious economic situation of poor households, the loss of income due to illness of income earners together with the costs of treating illness, have a significant impact, leading to or maintaining these households in a permanent state of poverty (Mehrotra & Jarret, 2002). Sometimes these health expenditures are limited and households can buffer them through short-term adjustment such as using savings, mobilizing funds from the community, or reducing its consumption of other goods. However, sometimes the required expenditure surpasses these coping mechanisms and households are forced to sell or mortgage their productive assets (Ensor & San 1996). These can represent important financial shocks.

A recent study by the World Bank (2001) on India concluded that out of pocket medical costs (estimated to be more than 80% of the total medical expenditure) alone may push 2.2% of the population below the poverty line each year. Although the richest 20% of Indians pay more in absolute terms, they have more resources to pay for health care, whereas the poor, in contrast, lack savings, assets, income, and the ability to borrow at low interest to pay for health care, forcing them into deeper poverty if they fall ill (World Bank, 2001; Misra 2003).

In Kerala, estimates of this burden of health care for the poor vary. Some have estimated it at 10% of yearly per capita consumption expenditure (Bhat & Jain, 2004), while others have suggested that the poor spend 40% of their income on health (Aravindan & Kunhikannan cited in Nabae, 2003). Some of households spent more than 100% of their annual income on health (Narayana, 2006).

Such a high level of spending is qualified as catastrophic health expenditure (Wagstaff & Van Doorslaer, 2003). In developing countries, lower income groups have a greater proportion of households with such catastrophic expenditure than higher income groups (Kawabata, Xu & Carrin, 2002). Households with elderly, handicapped, or chronically ill members are also more likely to be forced into catastrophic health spending (Kawabata, Xu & Carrin, 2002).

An analysis of NSS data from 1999-2000 suggested that out-of-pocket expenditures as a share of total consumption expenditures ranged from 3.4% among the poorest quintile to 4.4% in the richest quintiles in urban India (Garg & Karan, 2005). This amounted respectively to 8.3 and 8.8% of the non-food consumption expenditure. Most of the outpatient expenditure consists in drug costs (75%). Expenditure for outpatient services (14%) and inpatient services (11%) complete the total. For the poorest quintile, drugs amount to 84% of total OOP expenditure while outpatient care represents 11% and inpatient care only 5% of the total (Garg & Karan, 2005).

## 2.6 Quality and adequacy of health care

As was seen through this review of the literature, urban dwellers use a variety of health care sources, often at a heavy cost. Although various options for health care exist in urban areas, public and private, modern and traditional, these options offer different levels of quality (Mehrotra & Jarret, 2002; Salem & Fournet, 2003). Some reviews argue that developing countries' health systems are mostly inequitable by providing more services and services of higher quality to wealthy individuals compared to the services most accessible to the poor (Gwatkin, Bhuyia & Victora, 2004). The poor are more likely to turn to primary care services and less-qualified providers while wealthier groups consume a bigger share of secondary and tertiary services from more qualified providers (Mahal, Yazbeck, Peters & Ramana, 2001). The poor generally receive services of poorer quality compared to rich (Castro-Leal, Dayton, Demery & Mehra, 2000).

In relation to this, there is growing concern about the development of a two-tier health care system in India: non-poor individuals show a higher propensity to utilise large public or private hospitals, while the poor are relegated to lower levels of care and turn to ill-qualified private providers (World Bank, 2001). The better off pay higher fees mostly because they receive higher-quality services. The poor and uneducated have a higher probability of ending up with unregistered practitioners in India with obvious consequences on the quality of services received (Gupta & Datta, 2003; Misra, 2003).

### *Quality of services in the public sector*

Governments in developing countries are generally seen as failing to finance their health sector adequately because of limited budgets, faith in private market forces, or because of other competing priorities. Consequently, many public health care facilities lack maintenance. When public and primary care centres are available, lack of personnel, equipment, or drugs can lead to poor quality of services (WHO, 1998; WHO, 1993). This is especially true for interpersonal aspects of care, the public providers and staff showing often unwelcoming attitudes (Haddad & Fournier, 1995; Paphassarang, Philavong, Bouphe & Blas, 2002). In addition, wait times are longer in public facilities and availability of



services less reliable (Pannarunothai & Mills, 1997; Lönnroth, Tran, Thuong, Quy & Diwan, 2001).

In India, the public sector has been known for problems of health management, poor quality of services, and limited financial resources, especially in primary care unit and local health centres (World Bank, 2001). Inability to provide staff and ensure supplies at these facilities contributes to their low quality and utilisation (Mukhopadhyay, 1997). Presence of medical personnel below prescribed norms, lack of availability of consumables, obsolete or out-of-use medical equipment, and the dilapidated states of public sector buildings have been reported (Government of India, 2002). A recent survey suggested that only 38% of all Primary Health Centres (PHC) have all the essential manpower and only 31% have all the essential supplies, with only 3% of PHCs attaining 80% of all essential resources (Deogaonkar, 2004).

In Kerala, problems with the quality of public health care services are reported. Availability of medication and consumables is limited and irregular, maintenance, repair and replacement of building and medical equipment is problematic and there are concerns about staff motivation, absenteeism, and interpersonal behaviours (Kutty, 2000). A study found that most patients interviewed in exit surveys had needed to pay either for the purchase of drugs or for fees to health personnel even in governmental institutions in Kerala. Medical institutions of comparable size offer unequal quality of services in terms of staffing, availability of medicines, and quality of consumables (Narayana, 2006).

The overwhelming reason for low utilisation of the public sector in Kerala is the lack of adequate facilities (Varatharajan, Sadanandan, Thankappan & Mohan Nair, 2002). Reasons given for resorting to private hospitals include whether their services are adequate (23% of respondents) and whether their doctors behave in a better fashion (13%). With regards to quality of care in governmental institutions, the reasons for not using the government institutions were that no treatment was available (10%), that no medicines were available (14%), that no doctor was available (10%) that bribery was requested (5%) or that the premises were not clean (3%) (Kunhikanan & Aravindan, 2000).

*Quality of service in the private sector*

Studies suggest that the higher utilisation of private services among all economic groups in developing countries results from the perception of better quality of services in the private sector compared to available public services (Lönnroth, Tran, Thuong, Quy & Diwan, 2001; Brugha & Zwi, 1998; Zwi, Brugha & Smith, 2001). Reported reasons by users for utilising private services in low- and middle-income countries are the perceived low-quality of public services and adverse attitudes among staff of public health care facilities, more convenient location, more flexible opening hours, shorter wait times, better interpersonal manners and higher degree of privacy in private clinics (Lönnroth, Tran, Thuong, Quy & Diwan, 2001; Thaver, Harpham, McPake & Garner, 1998; Zwi, Brugha & Smith, 2001; Liu, Berman, Yip, Liang et al., 2006).

However, concerns are raised about the quality of care - especially the technical aspects and appropriateness of services - in the private sector, more so for services provided by informal or less-qualified providers (Mills, Brugha, Hanson & McPake, 2002; Zwi, Brugha & Smith, 2001; Brugha & Zwi, 1998). Studies also suggest poor prescribing practices in the private sector and a relative lack of preventive services (Maiga, Haddad, Fournier & gauvin, 2003; Thaver, Harpham, McPake & Garner, 1998). For the poor, consultation in the private sector often involves receiving a limited number of services - constrained by ability to pay - resulting in suboptimal care. This could mean receiving drugs alone - and often in insufficient amount - without proper examination, diagnosis and advice (Paphassarang, Philavong, Bouphe & Blas, 2002).

The literature on health care in India also highlights issues related to poor quality of care provided in the private sector (Mahapatra, 2003; Yesudian, 1999). The private sector is a heterogeneous sector where facilities can range from sophisticated hospitals serving the needs of affluent classes to clinics operating in dilapidated rooms in slums run by semi-qualified people (Yesudian, 1994). Over prescription of drugs and diagnostic and curative procedures and fee-splitting practices, and inadequate measures of waste disposal have been reported (Bhat 1999). These help account for a reported increase in health care expenditure in the private sector (World Bank, 2001). Private providers would spend less

time with patients and rely more on specialised referrals for care (Bhat, 1999). Regardless of type of provider, there are problems of quality assurance and poor clinical practices (World Bank, 2001).

Studies in India suggest that technical quality of care may actually be slightly better in the public sector while it is the interpersonal quality of care that is better evaluated in the private sector. Often superior quality of private sector health services is limited to non-clinical aspects like accommodation facilities (Yesudian, 1994). Yet, poor quality of practices overall can be found in both public and private sectors (Mahapatra, 2003).

In fact, the most recently available National Family Health Survey (NFHS-2, 1998-99) (IIPS, 2000) suggests slight differences in perceived quality of care by women between public and private health facilities during their most recent visit. There was no difference in the perception of receipt of the required services (99%) and median wait times (29 minutes). Private for profit or non-for-profit services were rated better with regards to the staff spending enough time with the patient (98% compared to 90% in public), the staff talking nicely to them (78% compared to 63%), the respect for privacy (84% compared to 68%) and cleanliness of the facilities (75% compared to 52%) (IIPS, 2000).

A study in Kerala suggested that private city hospitals had higher occupancy rates than public hospitals and that they provided more intensive and expensive services, using more x-rays and laboratory tests per patient (Soman & Thankappan, 1999 in World Bank, 2001). Whether it is a sign of good quality or of unnecessary expenses is difficult to say. Privately supervised deliveries had 1.7 times the chance of ending in caesarean section than in the public sector in Kerala (Padmadas, Kumar, Nair & Kumari, 2000). The differences in perceived quality between sectors and the costs associated with both private and public services suggest that access to quality services can be determined to some degree by economic means (Narayana, 2001).

## 2.7 The gap in knowledge

This review has highlighted various insights: Kerala is demographically characterised by a situation of low mortality, low fertility, and a raising life expectancy associated with an ageing of its population. It presents high levels of reported morbidity. Its achievements in the area of primary health care, maternal and child care, and prevention are outstanding. It has a well-developed public and private health infrastructure. Private health care costs increased over the last years and the public sector suffers from problems in quality of its services. However, some gaps remain in the knowledge about access to health care in Kerala, especially in urban areas.

First, few studies have assessed barriers to utilisation for underprivileged populations and there is a paucity of information about the role of poverty on access to health care in Kerala. Most of the studies reviewed focused on maternal, child, and preventive services. In addition, studies tend to be descriptive in nature and few have assessed disparities in access to health care controlling for various determinants. This is particularly the case for occupational status and caste. No studies have focused on access to health care for the urban poor and deprived. This leads us to the first set of study questions:

**1) What are the individual and household characteristics associated with barriers to access to health care in urban Kerala? What are the specific barriers to access for the urban poor and economically deprived?**

Second, our review did not identify information about the effect of urban environments and their specific characteristics on access to health care. The only studies found in the literature were conducted *in* specific urban locales and did not study the effect *of* these contexts on access. Not much is known about the variations in access to health care across urban areas, according to the size of towns, their levels of wealth and of availability of health services. Identifying characteristics of urban areas that impede or facilitate access to health care can inform health care policy both for priority-setting and targeting purposes. In addition, characteristics related to the availability of public and private infrastructure are

especially amenable to interventions and should be identified. Our second set of study questions is thus:

**2) Does access to health care vary across urban contexts in Kerala? What are the urban characteristics associated with restrictions in access? What is the role of urban size and other urban attributes on variations in access to health care? What is the role of public and private urban health systems on variations in access to health care?**

Finally, there is limited evidence on the distribution of health care cost in urban Kerala - across public and private sectors. The context of rising health care expenditure raises questions for the future, as poor and economically vulnerable individuals could face increasing economic burden related to utilisation of health services. This can have a direct impact on both standard of living - through impoverishment or deepening of poverty - and ability to pay for health care, effectively restricting access to health care. Most studies have limited themselves to assessing the proportion of public spending on health that reaches the poor and have overlooked the private expenditure in the assessment of the economic burden for the poor. Our third set of study questions is:

**3) What is the economic burden of hospital care across social groups and across sectors of care in urban Kerala? To what extent, is hospital expenditure a burden for the poor?**

These three sets of study questions will be addressed throughout this thesis - through the analyses presented in the three papers. The first two papers will both partly address the first two study questions - the first through an analysis of outpatient care services and the second through the analysis of hospitalisations. The third paper - in addition to addressing these first two questions - will provide evidence towards answering the third question.

## 3 CONCEPTUALISING ACCESS TO HEALTH CARE

In this section, we briefly review the literature on the conceptualisation of access to health care services and propose a framework that will guide the measurement, analyses and discussions presented in this thesis. This framework serves as a basis for formulating specific hypotheses related to the study questions outlined at the end of the previous section.

### 3.1 The definitions of access to health care

Although access receives a lot of attention in research and policy debates, its definition, as well as its assessment, poses challenges. Access is a complex notion and its interpretation is not uniformly understood (Daniels, 1982; Haddad & Mohindra, 2002). This is exemplified in the heterogeneity of definitions and conceptualisations found in the literature and the almost interchangeable use of the terms *access*, *accessibility* and *utilisation of health care services*. While it is not our intention in this chapter to settle the debate on the various ways to see access, we will expose our views about the concept and its measurement for the purpose of this dissertation.

In terms of linguistic definition, *access* either describes a “*way of approaching or reaching or entering; the right or opportunity to reach or use or visit*” when it describes the status of a person or agent, or the “*condition of being readily approached (accessibility)*” when referring to a resource (Canadian Oxford Dictionary, 1998). In this sense, *accessibility* is a property of that which is *accessible*, a characteristic of something that can readily be reached, entered, or used (Canadian Oxford Dictionary, 1998). *Utilisation* is to make use of or consume such services. Opinions differ in the health services literature regarding the extent of factors considered through the concept of access. Is it a characteristic of health providers, facilities and systems? Or is it something that persons, households and social groups have or realise? Table 2.1 summarizes various definitions and dimensions covered from the literature on access to health care. The reader will find the aforementioned heterogeneity in definitions through the cited authors.

Table 2.1 Definitions and dimensions of access to health care

<b>Authors</b>	<b>Definition</b>	<b>Dimensions</b>
Bashur et al., 1971	Accessibility as the functional relationship between the population and medical facilities and resources, and which reflects the differential existence either of obstacles, impediments and difficulties, or of factors that are facilitators for the beneficiaries of health care	
Donabedian, 1973	Accessibility comprising the concept of degree of adjustment between resources and populations	
Salkever, 1976	Accessibility combining attributes of the resources and attributes of the population	<b>Financial accessibility</b> <b>Physical accessibility</b>
Aday & Andersen, 1974	Access as entry into the health care system	<b>Predisposing factors</b> <b>Enabling factors</b> <b>Need for health care</b>
Penchansky & Thomas, 1981		<b>Affordability</b> <b>Accessibility</b> <b>Accommodation</b> <b>Availability</b> <b>Acceptability</b>
Dutton, 1986	Utilisation viewed as the product of patients characteristics plus provider and system attributes	<b>Financial</b> <b>Time</b> <b>Organizational factors</b>
Frenk, 1992	Access as the ability of the population to seek and obtain care  Accessibility is the degree of adjustment between the characteristics of health care resources and those of the population within the process of seeking and obtaining care	
Margolis et al., 1995	The timely use of personal health services to achieve the best possible outcomes.	<b>Financial</b> <b>Personal</b> <b>Structural</b>
Haddad & Mohindra, 2002	The opportunity to consume health goods and services	<b>Availability</b> <b>Affordability</b> <b>Acceptability</b> <b>Adequacy</b>
Shengalia et al., 2003	Coverage: probability of receiving a necessary health intervention, conditional on health care need  Utilization: quantity of health care services and procedures used	<b>Physical access</b> <b>Resource availability</b> <b>Cultural acceptability</b> <b>Financial affordability</b> <b>Quality of care</b>

In his seminal work, Donabedian (1973) describes access as the characteristics of health systems that impede or promote the utilisation of services. These characteristics are mediating factors between the production of services and their actual consumption or utilisation by people. Thus access relates to attributes of health services and refers to the way in which these services and facilities are organised (Frenk, 1992; Salkever, 1976; Mooney, 1983).

A different conceptualisation sees access as describing the action of reaching and using health services or resources. This view centres the conceptualisation of access around utilisation of health care services and the action of gaining entry into the health care system, conditional on need for health care (Daniels, 1982; Waters, 2000). According to this conceptualisation, access is something that people *do*, in opposition to the view which describes access (or accessibility) as what services *are* (Shengalia, Murray & Adams, 2003; Shengalia, Tandon, Adams & Murray, 2005). This is also seen in Andersen (1995), who suggests a distinction between *potential* access - defined as the presence of enabling factors and absence of barriers - and *realised* access - the actual use of services.

A theoretically attractive conceptualisation sees access as resulting from the interaction between the characteristics of populations (demand) and those of the health care resources (supply) (Musgrove, 1986; Frenk, 1992; Mooney, 1983). This idea is also found in Donabedian (1973) and Penchansky & Thomas (1981) and in Bashur et al. (1971) defining access as a functional relationship between the population and medical facilities and resources, which reflects the differential existence either of obstacles, impediments and difficulties or of factors that are facilitators for the beneficiaries of health care. The notion of access would thus point to the complementarities between the health care resources and the population of real or potential users (Frenk, 1992). Under this conceptualisation, health services are accessible if their specific characteristics - geographic availability, organisation, price, acceptability, etc - fit with the ability of people they intend to serve to seek and obtain care. The attributes of persons and households - seen as *utilisation power* - and attributes of supply - seen as *resistance* - result in access to health care (Frenk, 1992).

This is in line with the view that sees access to health care as resulting from predisposing factors on one side, and enabling and health system factors on the other (Aday and Andersen, 1974; Aday & Andersen, 1981). Predisposing factors include an individual's perception of an illness, as well as population-specific cultural, social, and epidemiological factors. Enabling factors include the means available to individuals for utilising services. Health system factors consist of resources, structures, procedures, and regulations through which health services are delivered (Shengalia, Murray & Adams, 2003).



In addition to these factors pertaining to the structural features of the health care system and features of individuals (consisting of predisposing and enabling factors) a comprehensive view of access includes process factors describing the ways in which access is realised (Daniels, 1982). It can be assessed by looking at variations in utilisation of health services according to supply factors and individual and household conditions, removing variations due exclusively to individual choices (Shengalia, Tandon, Adams & Murray, 2005). Studies on access thus focus on health system characteristics (supply factors) explaining patients' health seeking behaviour (demand factors) in studies of utilisation of health care services - the actual consumption of goods and services (Frenk, 1992; Andersen, 1995).

However, access is different from utilisation of health care services. Access to health care depends on the availability of health services in time and place and the capacity of people to reach and utilise these services. This notion of access as capacity to utilise relates to the definition suggested by Mooney (1983). Equality of access is about equality of opportunity to obtain health care more than its equality in utilisation which is also influenced by a broader set of determinants - such as preferences and health care needs (Mooney, 1983). This relates to the view that access is an opportunity or ability to obtain health care and consume health goods and services - whether the need for care is present or not, and whether this need is anticipated or not (Haddad & Mohindra, 2002; WHO, 1998).

### **3.2 A framework of access to health care**

In this thesis, we define access as **the opportunity to obtain appropriate health care services**. This notion of opportunity is defined as a *chance or opening offered by circumstances* (Canadian Oxford Dictionary, 1998). Access results from the interface between the attributes of persons, households, social and living environments and the attributes of health systems and organisations. From this perspective, access is the possibility for people to enter in contact with and utilise health care. It results from various barriers and facilitators pertaining to both population and contextual attributes. We consider utilisation of health care services - controlling for various determinants - as realised access and non utilisation of health care services - when faced with need for care - as an

expression of lack of access to health care. However, not every case of non utilisation or disparity in utilisation reflects lack of access - since utilisation is also influenced by health care needs, preferences, and expectations. Disparity in utilisation - for similar preferences and need for care - reveals disparities in access to health care.

In addition, we consider the process involved in utilising health care services - in terms of sources of care, reasons expressed for utilisation and non utilisation, and the economic effort involved in utilising these resources - and its variations according to individual, household and contextual characteristics to reveal variations in access to health care. Access to health care can still be restricted, even though people utilise health services in proportion to their need for health care, if some people are subjected to a greater effort in doing so, or if they end up with services of differential quality. Equality of access to health care is about equal opportunity to obtain care - of equal quality and for an equal effort.

### *The dimensions of access to health care*

Access to health care is a multidimensional concept relating to factors pertaining to the availability of acceptable and appropriate services – related to geographical, temporal, organisational, social, cultural, and clinical factors – and their affordability by potential users. The last column in table 3.1 synthesizes some dimensions suggested in the literature for the analysis of access to health care. Despite some variations due to the underlying definitions of access adopted, some common ground emerges. The conceptualisation we retain for this analysis comprises four dimensions of access to health care: 1) availability of services (geographic and organisational); 2) acceptability of health care; 3) affordability of health care; 4) and adequacy of health care (Haddad & Mohindra, 2002).

**Availability** of services describes the characteristic of something that can be used, at one's disposal, obtainable (Canadian Oxford Dictionary, 1998). In the health research field, it constitutes the physical existence of health resources with sufficient capacity to produce services (existence of productive facilities) (Frenk, 1992). As such availability reflects the fact that health institutions are present in areas where people live and are organised in a

manner that permits their utilisation. It results from characteristics of facilities (e.g. density, concentration, and distribution), of contexts (e.g. decentralisation, urban spread, and transportation system) and of health personal (e.g. duration and flexibility of working hours). Access to health is diminished if resources and services are not evenly distributed in relation to where potential users live and work or if organisational barriers to utilisation - such as strict registration or appointment systems - are imposed (Whitehead, 1992).

**Affordability** of services reflects the level of economic investment required to utilise health care. It derives from direct prices of services (e.g. medical fees, cost of drugs) and related expenses (e.g. transportation costs and lodging) in addition to health care related loss of income (Jourdain, 2000; Russell, 1996). Furthermore it depends on the modalities required to pay for the services (e.g. mode of payment, possibility of loans) (Mooney, 1983; Culyer & Wagstaff, 1993). In this sense, access relates to the level of effort necessary to utilize medical care, including not only direct charges for care, but also the cost of transport and the time and income losses involved (Muurinen & LeGrand, 1985). However, affordability is broader than the concept of costs since it implicitly involves the idea that these various costs can or cannot be afforded by the people intending to use health services.

**Acceptability** relates to cultural and social factors determining the level of concordance of health services characteristics with social and cultural norms and beliefs. Some services may be unacceptable to some sections of a community they intend to serve because of the way they are organized (Whitehead, 1992). Acceptability entails the possibility for people to accept various aspects of health services (e.g. the sex or social group of providers, the beliefs associated to systems of medicine) and the appropriateness for the persons to seek health care. For example, a society forbidding casual physical contact between unmarried men and women would reduce acceptability of care and acceptability to seek care for women if health providers are mostly males. In the absence of acceptable options for care, access to health care is restricted.

**Adequacy** relates to the appropriateness (what services are provided) and quality (the way in which they are provided) of health services. This translates into both technical and interpersonal aspects of health care (Krishnan, 2000; Frenk, 1992). Clearly, the content and

effectiveness of health services and goods one has the opportunity to utilise matters (Shengalia, Murray & Adams, 2003). Opportunity to utilise services of poor quality in this sense is seen as restriction of access to health care. Some suggest that these dimensions - acceptability and adequacy - should not be part of access (Frenk, 1992). Our reasoning is that one should not have access to health care based on geographical and organisational availability and affordability alone, but that access encompasses the possibility to resort to acceptable and effective services. The opportunity for a person to utilise the services of untrained practitioners (e.g. witch doctors, healers) cannot be equated to the opportunity for another person - wealthier - to utilise highly specialised services, if these services generate different health outcomes or satisfaction towards services. Utilisation of services with inherently differential technical quality - either through the utilisation of different types of providers or through differential prescription practices - cannot be seen as equal *care*.

Finally, the various dimensions of access identified do not represent completely independent constructs (Haddad & Mohindra, 2002). They often influence each other and matter at different times during an episode of illness and care (Béland & Stoddart, 1994; Hornbrook, Hurtado & Johnson, 1985; Leduc, 1999). As an example, geographic availability can interact with affordability of transportation in influencing access to health services. These constructs should thus be considered interrelated.

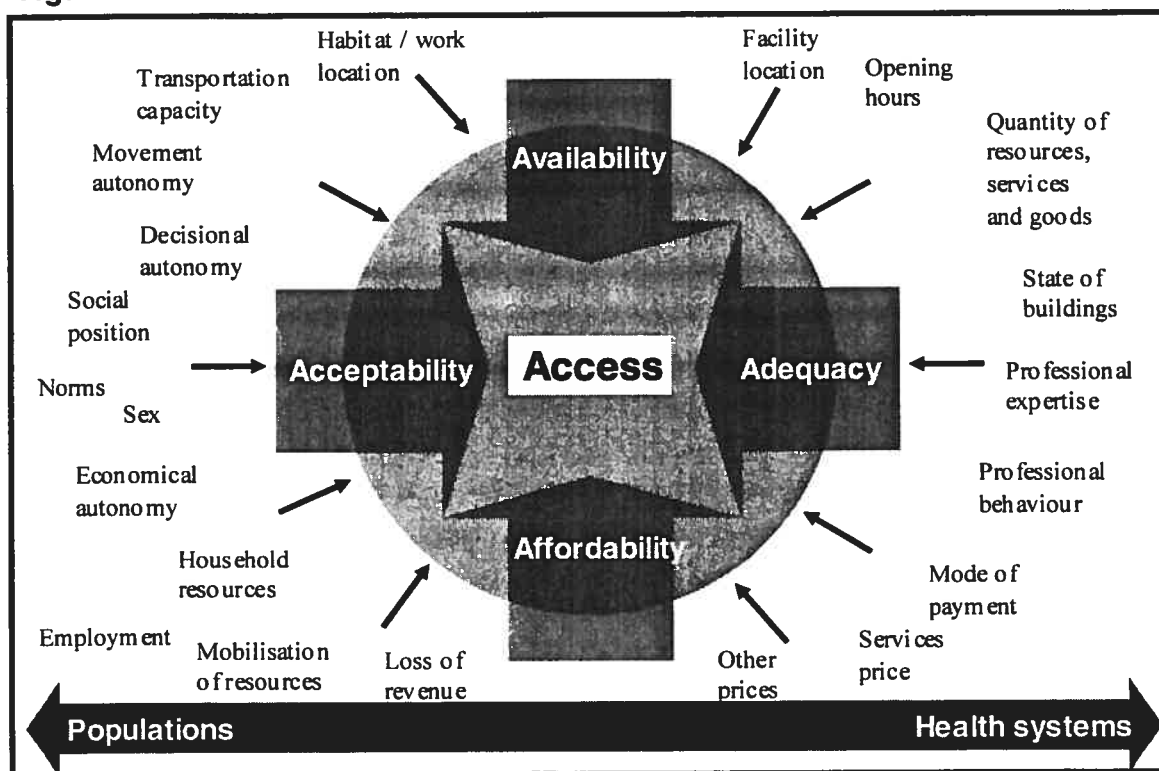
#### *The determinants of access to health care*

There is considerable interest in geographical variations in access to health care and in the effect of context on health related problems (Weich, Burton, Blanchard, Prince, Sproston & Erens, 2001; Diez-Roux, 2000). Factors related to the characteristics of living environments are determinants of access to health care in addition to characteristics of individuals and the overall availability of health care services (McDade & Adair, 2001; Ecob & Macintyre, 2000). Characteristics of households, living environment and health systems are enabling factors or barriers to access (Andersen, 1995; Unschuld, 1975). Individuals are affected by social, cultural, economic or physical factors, and studies on health care seeking behaviour need to emphasise structural constraints as well as personal choices (Duncan, Jones & Moon, 1996, 1998; Ecob and Macintyre, 2000). Structural effects could cause people with

similar individual attributes to have different access to health care depending on where they live (Curtis & Jones, 1998). The interaction between these factors and household and individual characteristics generates ability to obtain health services and opportunity to choose (not being constrained to a single option).

We view access to health care services as resulting from the interaction of determinants pertaining to characteristics of populations (e.g. the place where people live, their economic resources and their social status) and of services (e.g. quantity, location of facilities, costs). Figure 3.1 illustrates some determinants of access pertaining to providers, health facilities, health systems (*health systems*), individuals, households, and living environments (*populations*) in relation to the four dimensions conceptualised in this thesis. This figure presents a broad array of possible determinants, influencing various dimensions of access. These determinants can either be facilitating (decisional autonomy, transportation capacity, and economic resources) or impeding (distance between facilities and living environments, costs of health services, poor quality of services) access to health care.

**Figure 3.1 The determinants of access to health care**



*Our application of the framework*

Measuring access to health care poses challenges. Access - conceptualised as the opportunity to obtain health care - cannot be measured directly. However, utilisation and non-utilisation in cases of perceived need for services can reveal variations in access to care (Waters, 2000; Andersen, 1995; Daniels, 1982). Variations in terms of utilisation, delay before utilisation, the type and intensity of services received as well as the duration of utilisation can also inform about access to health care (Haddad & Fournier, 1995). Inferential analyses of access to health care require the measurement of variations in utilisation and types of services utilized, according to plausible determinants of access to health care (Haddad, 1992; Shengalia, Murray & Adams, 2003). Our framework emphasizes that access problems can be revealed at the various stages of an episode of illness: non utilisation, unmet needs for care, health care choices and economic burden of care are part of the assessment of access to health care (Diehr, Yanez, Ash, Hornbrook & Lin, 1999). The care that individuals consume is a function of their own demographic, social and economic characteristics as well as characteristics of the health systems and of the environment in which they live (Haddad and Fournier, 1995).

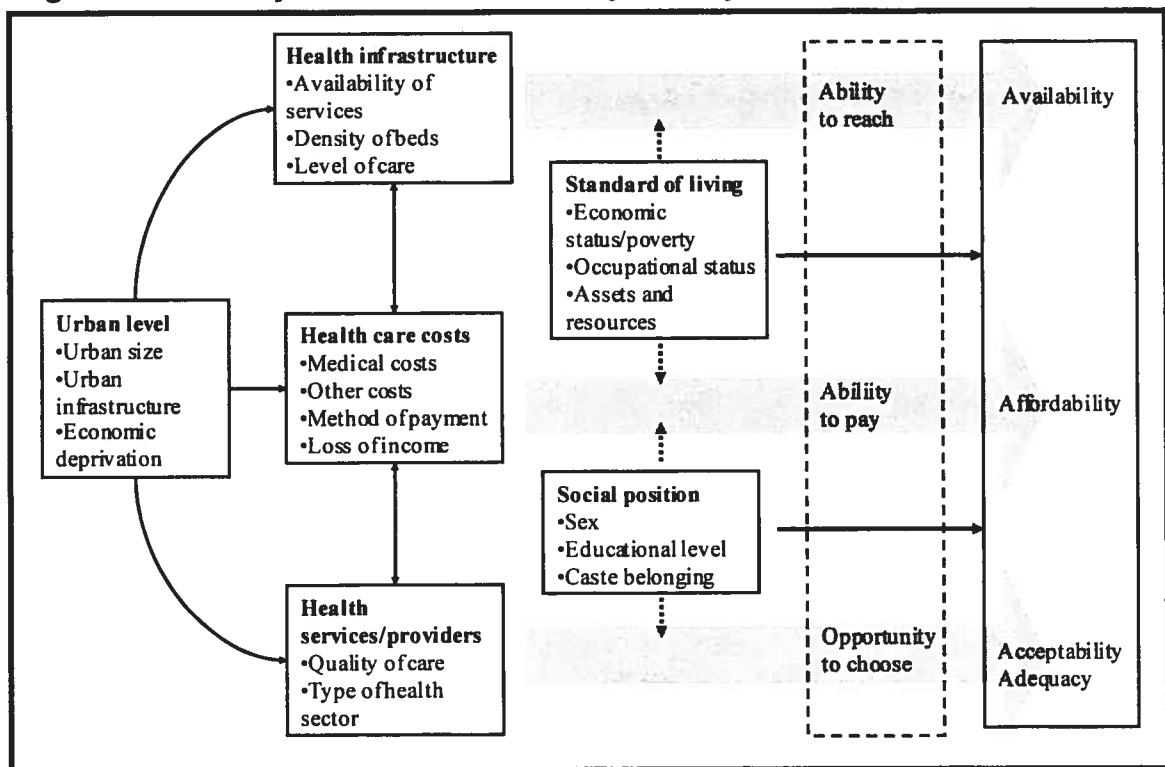
In this thesis, we postulate on the existence of structural effects of physical and social environments on utilisation of services by individuals. This will enable us to use variations in utilisation as markers of disparities in access to health care - in situations of perceived need for care. When characteristics of populations are studied simultaneously with characteristics of health systems, variations in utilisation of health care services, in sources and intensity of services utilised, and in economic burden of health care, can generate inference about access to health care.

Not all measures described in this framework are available for analysis, because of the nature of information contained in available population surveys. Figure 3.2 illustrates how individual and household characteristics (e.g. poverty), urban and health systems characteristics (e.g. urban size and density of beds) available to our study may effect access to health care. This figure positions contextual and health systems' features in relation to individual and households' attributes in the generation of opportunities to obtain health

care. For example, urban size might correlate with characteristics of living environments - such as the level of infrastructure - and aspects of health care - such as the type of health provider - and influence opportunity to choose between options for their inhabitants. Health care costs could have a different impact on the poor or casual worker's ability to pay for health services. Urban and health care level factors' interactions with household and individual characteristics would generate ability for individuals to reach, ability to pay and opportunity to choose health care, revealing variations in the four dimensions of access.

The first two papers included in this thesis will present the results of analyses looking at the relationship of standard of living and social position measures with urban level and health infrastructure and services measures - to reveal disparities in ability to reach and availability, opportunity to choose and acceptability and adequacy. The third papers mostly assesses the relationship between standard of living and social position measures with health care costs and health services measures - to reveal disparities in ability to pay and affordability of health care.

**Figure 3.2 Pathways of effect and main explanatory variables**



### *Study hypotheses*

Our first set of study questions pertains to the identification of individual and household characteristics associated with barriers to access to health care - with a specific emphasis on understanding the effect of poverty and deprivation on access. In our framework, such characteristics relate to standard of living and social position. Through lower ability to pay for health care services, lower opportunity to choose between options and lower ability to reach care, we hypothesize that:

**Despite progress made in terms of human development and a generally favourable environment, disparities in access remain in Kerala. Even in a context of high availability of health services, deprived populations - such as the poor, casual worker and scheduled caste/schedule tribe (SC/ST) - are subjected to barriers to access to health care in Kerala [Hypothesis 1a];**

**and their access to health care is particularly restricted in the private sector [Hypothesis 1b].**

Our second set of study questions pertains to the identification of variations in access to health care across urban areas and the identification of urban level determinants of access to health care. In our framework, such characteristics relate to the urban level. The idea here is that levels of economic development and of population wealth influence access to health care. Under the assumptions that wealthier areas facilitate access whereas poorer areas concentrate barriers, we hypothesize that:

**Because of lower availability of public and private health services, inhabitants from small towns, urban areas with low proportion of permanent houses and high proportion of deprived populations have lower access to health care in Kerala [Hypothesis 2a];**

**and their access to health care is particularly restricted in the private sector [Hypothesis 2b].**



Also related to the second study question, we expect access to health care to be better in urban areas with a wider range of facilities (from primary health care to medical colleges) and a higher density of hospital beds - especially public sector beds. We therefore hypothesize that:

**Because of higher availability of health services, inhabitants from cities having a wider range of public infrastructure and urban areas with high density of public hospital beds have higher access to health care in Kerala [Hypothesis 3a];**

**and their access to publicly provided services is higher [Hypothesis 3b].**

Finally, our third study question relates to the economic burden that various social groups are subjected to due to hospitalisations and the specific burden that the cost of hospital care represents for the poor. We expect health care costs to be high in urban Kerala - especially in the private sector - and to be related to economic status. In particular, our assumptions are that the poor are subjected to a high economic burden. Our last hypothesis is thus that:

**Given that prices of services are high and that financial protection against illness and health care costs is low, the economic burden related to hospital care is expected to be high in urban Kerala. We hypothesize that the economic burden of health care is going to be higher in the private sector [hypothesis 4a];**

**for chronic illnesses [hypothesis 4b];**

**and for economically deprived individuals [hypothesis 4c].**

## 4 METHODS

Our objective is to better understand disparities in access to health care in urban Kerala and identify individual, household and urban level determinants of inequalities in access. As previously stated, we will assess variations in utilisation of health care services and the process involved in utilising these services - with regards to utilisation pathways, sources and economic burden - to provide inferences on access to health care. This section explains the methodology employed. We will describe the source of data, operational definitions of variables and analytical strategy.

### 4.1 Source of data

#### *The National Sample Survey on health care*

This study is based on the analysis of the urban sample for the state of Kerala from the survey on health care (Schedule 25.0) of the 52<sup>nd</sup> round of the National Sample Survey (NSS) conducted in 1995 and 1996 by the National Sample Survey Organisation (NSSO, 1996). The NSSO is a branch of the Department of Statistics from the Government of India. It is a permanent survey organisation which was set up in 1950 to collect data on various facets of the Indian economy through nation wide surveys. The NSSO conducts an annual cross-sectional survey on various aspects of households' consumption and utilisation of governmental and non governmental services.

The NSSO is the most important household survey organization in India. It has conducted eleven surveys related to health or health care since its inception. Other surveys, such as the *National Family Health Survey* and the *Rapid Household Surveys* mostly target problems related to maternal and child health. No other survey in India addresses the issue of health care and morbidity for the entire population in the same way as the NSS survey.

*Sampling design of the NSS survey on health care*

This survey adopted a stratified two-stage stratified sampling design. The first-stage units (FSU) consisted of NSSO urban frame survey blocks. The second-stage units were households. A specific number FSUs to be selected was allocated in each urban stratum (Table 4.1). FSUs were selected circular systematically with equal probability of selection. This ensures a representative sample of the reference population. The survey period – from July 1995 to June 1996 - was split into four sub-rounds with equal numbers of FSUs selected in each sub-rounds to prevent biases related to seasonal morbidity.

Table 4.1 Stratification of first-stage sampling units

Urban strata*	Population in the urban area
1	Less than 50,000 inhabitants
2	50,000 to 199,999 inhabitants
3	200,000 to 999,999 inhabitants
4,5**	1,000,000 inhabitants or above

\*as per information from the 1991 Census.

\*\* Each city of more than one million inhabitants formed a separate stratum.

In NSS, ten households were selected from each urban block for the schedule on health care. All households in the urban blocks were listed and grouped into second-stage strata according to the presence or absence in the households of a child below 1 year old and the presence or absence of any case of hospitalisation (Table 4.2). Following this stratification, 2 household were selected from the first strata, 2 households from the second strata and 6 households from the third strata all at random. In Kerala, 208 urban blocks were surveyed for a total of 2078 households. Only 2.6% of intially selected households had to be replaced. Among these, the main reasons for replacement were non-availability of the household (76%), household head unwilling to participate (9%) or other reasons (15%).

The first-stage units were selected circular systematically with equal probability of selection. Because of the stratified sampling at the household level in each urban block, unequal probabilities of selection arise among households in Kerala. This comes from the fact that the number of households in the urban block, the proportion of households with a

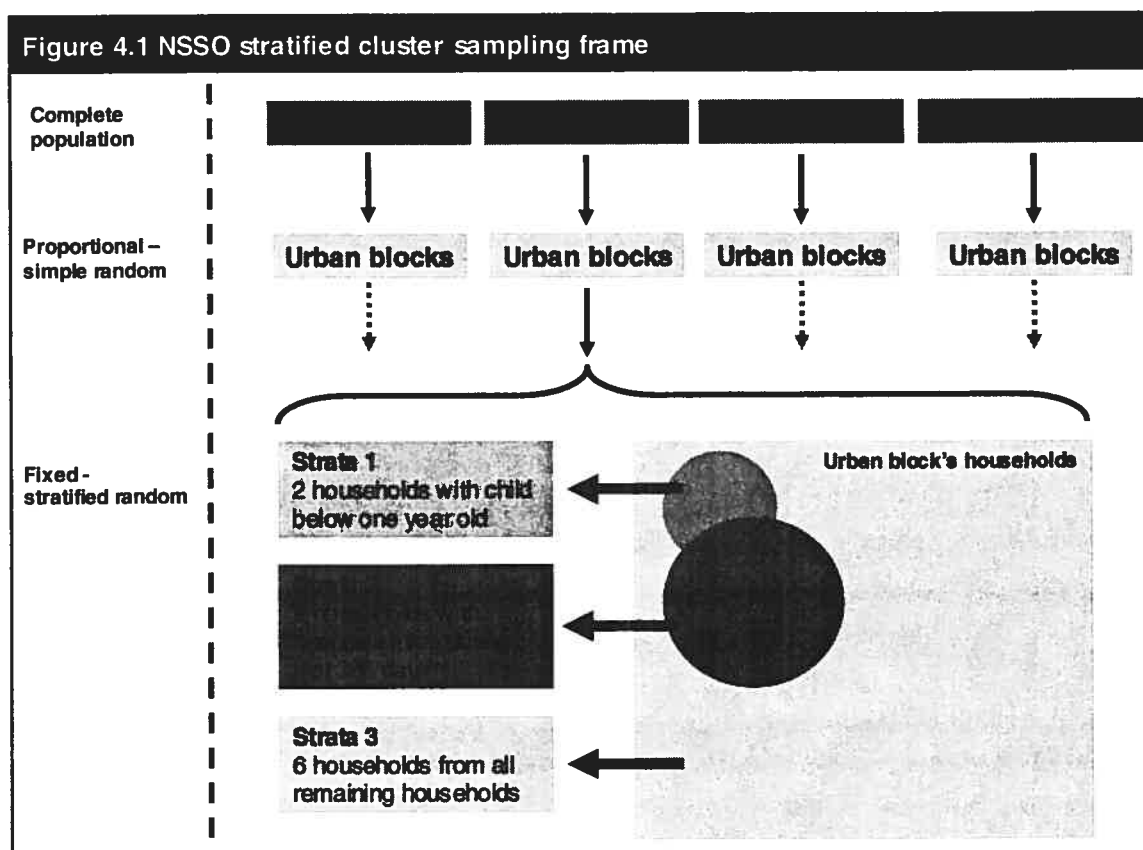
child below 1 year of age, and the proportion of households with at least one hospitalisation episode in the last year would vary between urban blocks. Thus, the weighting from this survey needs to correct for the unequal probability of selection of households.<sup>8</sup>

Table 4.2 Stratification of second-stage sampling units

Household strata*	Household characteristics
1	Households reporting at least one child of age below 1 year of age
2	Of the remaining households, those reporting any case of hospitalisation* during the last 365 days
3	Remaining households

\*as per information from the urban block list of households.

Figure 4.1 illustrates the sampling design used in NSS 52<sup>nd</sup> round.



<sup>8</sup> This sampling procedure and the usage of weights in analyses create design effect which needs to be taken into account. In this study, hierarchical analyses and resampling methods (bootstrapping and markov-chain monte-carlo procedures) were employed to this effect.

Every member of each household shares the same weight and households from a similar stratum from one block also share the same weight.<sup>9</sup> The weightings provided by NSSO were expanded to the population and have been re-weighted (divided by the urban population to provide weightings of 1 on average and a weighted sample size equal to the non weighted sample size) to avoid inflation of statistical power. Table 4.3 shows the non weighted sample size, minimum and maximum weights, and the sum of weights and mean of weights for each file used in this thesis. There is no significant difference in sum of weights between weighted and non weighted samples.

Table 4.3 Non weighted and weighted sample sizes.

<b>Data files</b>	<b>Non weighted sample size</b>	<b>Minimum-maximum weights</b>	<b>Sum of weights</b>	<b>Mean of weights</b>
Household level	2078	[0.06;4.67]	2078	1.00
Individual level	10314	[0.07;5.08]	10314	1.00
Outpatient care	423	[0.07;4.77]	412	0.97
Hospitalisation	691	[0.07;4.95]	695	1.01
Hospitalisation expenditure	682	[0.67;4.95]	686	1.00
Economic burden	524	[0.07;4.95]	508	0.97

#### *Information available in the NSS survey on health care*

The survey on health care (52<sup>nd</sup> round) collected data related to perceived illness and utilisation of health care services. The four main topics covered were 1) utilisation of maternity and child health care services; 2) reported morbidity; 3) utilisation of medical services; 4) and problems of aged persons (60 years and above). In this study we limited our analysis to topics 2 and 3 related to reported morbidity and utilisation of medical services. Information related to the characteristics of household members (e.g. age, sex) and

<sup>9</sup> A complete description of urban block characteristics and probabilities of selection of households was available. Because of the sampling strategy, every selected urban block had three possible weights for its households: one for the 2 households selected at strata 1 (child below 1), one for the 2 households selected at strata 2 (hospitalisation) and one for the 6 selected households from the remaining households in strata 3.

their illness and hospitalisation episodes (e.g. source of care, health-related expenditure) and on characteristics of households (e.g. consumption expenditure, employment status, and caste) was also collected. The questionnaires were validated and pre-tested. Interviewers were trained to accurately record answers.

Information was collected about every member of each household. Adult males were always interviewed in person while interviews with females were sometimes conducted through intermediaries. Information on children was obtained from the mothers. The general information pertaining to the household characteristics was collected from the principal informant. As a result, the quality and accuracy of this information depends on the capability and attitude of the principal informant. Among the selected and participating household principal informants in the urban Kerala sample, 94% were evaluated as cooperative and capable to respond to the survey. Only 6% were evaluated as cooperative but not able to respond. There were no differences between caste groups and economic groups regarding the quality of response as evaluated by the interviewer. There were slightly higher levels of respondents not able to respond in the districts of Thrissur (19%), Allapuzha (18%) and Thiruvananthapuram (28%).

The National Sample Survey questionnaire used in this study is Schedule 25.0: Survey on health care (see appendix 1). This questionnaire is made up of various sections divided in 11 blocks. Blocks 0, 1, and 2 identify and describe the characteristics of the sampled households. Block 2 includes the collection of information related to the employment status, household expenditure, characteristics of living environments, and description of household demographic composition. These household level items employed in this study are defined and described in table A2.1 in appendix 2.

Block 3 describes the demographic characteristics of household members. This information pertains to the relationship between each individual and the head of the household, their age, gender, marital status, occupation, and occurrence of hospitalisation in the last year and occurrence of ailment in the last 15 days. This block also contains information related to pregnancies [3.1], deaths of household members [3.2] and health risk factors [3.3].

Block 4 relates to illnesses and medical treatments of persons hospitalized during the last 365 days. It serves to collect information about the demographics of hospitalised members, type of hospital and ward utilised, details related to the duration of hospitalisations and certain services received before, during, and after the hospitalisation. Table A2.3 in appendix 2 provides a definition and description of the items used in this thesis related to this block. Section [4.1] details the expenditure for hospital care and sources of finance to meet the expenditure incurred. Table A2.4 in appendix 2 provides a definition and description of the items used in this thesis related to this block.

Block 5 relates to illnesses of household members in the last 15 days and medical treatment received as an outpatient. This section collects information related to the demographics of ailing household members, the duration and severity of illness, sources of treatment if any and reasons for absence of treatment or utilisation of non-governmental institutions. Section [5.1] details the expenditure for outpatient care and sources of finance to meet the expenditure incurred. Table A2.2 in appendix 2 provides a definition and description of the items used in this thesis related to this block.

Only blocks 1 to 5 were used in this study. The other blocks relating pregnancies, child care and economic independence of elderly were not used as part of this work. The NSS questionnaire can be found in Appendix 1. Tables in Appendix 2 mentioned above provide the relevant definitions and descriptions of NSS items used in the various parts of this study and can be referred to for further clarifications.

#### *Survey of public and private infrastructure*

Data related to the availability of medical facilities used in this study come from surveys of government and private institutions. Data related to the availability of Government institutions are reported every year in Kerala. This study uses data related to 1995-1996. The survey of private institutions was conducted in March 1995 by the Government of Kerala, Department of Economics and Statistics. This survey canvassed all districts of Kerala to identify the number of private facilities under various systems of medicine. The definition of medical institution being an institution where patients are examined for

diagnosis of diseases and medical treatment prescribed and provided. Places or institutions where only consultation facilities are available such as consulting rooms and institutions engaged only in selling medicines were not covered in this census. A private medical institution is defined in this survey as a medical institution run by individual(s) or an organisation (e.g. trust, co-operative society, company) other than Government. Institutions receiving Government grants were also considered as private medical institutions. The information we used from these surveys were the density of infrastructure and hospital beds in the public and private sectors for each districts.

#### **4.2 Data cleaning and construction of analytic files**

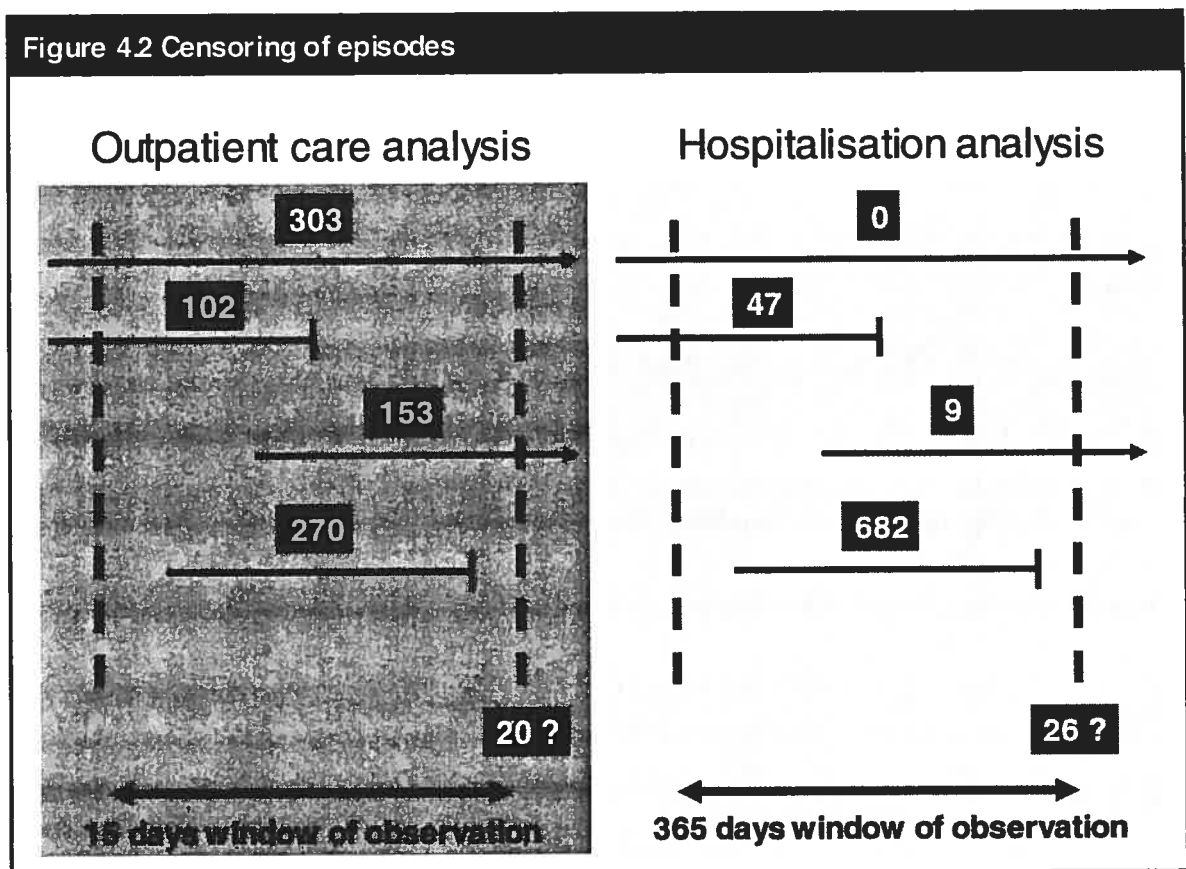
The data files provided by the NSSO were merged to create four principal working files: household level file (containing all household characteristics), individual level file (containing all individual characteristics), outpatient care file (containing all variables related to illness episodes in the last 15 days) and hospital care file (containing all information from individuals hospitalised during the last 365 days). A fifth file for the urban areas was created from available information from the Surveys of private and public institutions.

The first step of data cleaning was to delete all non informative variables (absence of variability) from the files and deal with missing information. Variables presenting more than 10% of missing values were excluded from the analysis. For most variables there were very low levels of missing information. No imputation was performed and missing values were treated as such in most analyses. For multilevel models, cases with missing values were excluded. The proportion of excluded cases remained below 5% across all analyses. We then proceeded to a re-coding of continuous variables to facilitate comparisons of proportions and averages. Re-coding preceded the analytical part of the study and was done on conceptual ground or a-priori knowledge. Variables were cross-tabulated to assess for the presence of impossible combinations. Continuous variables were assessed for the presence of outliers (extreme values). Outliers for health expenditure were truncated at a



ceiling corresponding to the expenditure level of the 95% of the sample to reduce the influence of outliers on regression analyses.

In NSS, the questions pertaining to utilisation of services, sources of care, and health expenditures were stated in such a way that it was difficult to distinguish utilisation during the recall period from utilisation happening before the recall period. For this reason, only cases starting during the recall period were kept for analysis and left censored episodes - those starting before the survey period of observation - were excluded.<sup>10</sup> Figure 4.2 presents the number of censored episodes in outpatient and hospital analyses.



For multiple illnesses during the 15 days recall (only 13 cases had more than one illness episode in the 15 day recall), only one illness was kept for analysis. The selection rule gave precedence to acute illnesses over chronic diseases. In situations of similar illness conditions, only the first one in the recall period was kept for analyses. For patients having

<sup>10</sup> For outpatient care, 405 episodes of illnesses started more than 15 days prior to survey. For hospital care 47 cases started more than 365 days prior to survey. These cases were excluded.

used more than one source of treatment in a single episode, the principal source of care was considered to be private if any private sources were used during the illness episode for outpatient care services. All hospitalisation episodes and sources were kept for analyses.

### **4.3 Construction of study variables**

#### *Dependent variables*

Utilisation of ambulatory health care services in face of perceived need for care was a yes/no type of question and was studied as a dichotomous variable. Sources of outpatient care services were recoded to create a dichotomous variable (public/private). The public category includes government institutions from various levels of care while the private category includes both for profit and not-for-profit privately run institutions. The hospitalisation source variable was created by combining the type of hospital consulted (public vs. private) and the type of ward (free vs. paying) admitted to. Three categories (free public, paying public and private) remained since very few individuals (<1%) were hospitalised on free wards of private hospitals. Health expenditure information provided by NSSO was used and renamed as per methods describe in the third paper of the present thesis. Further methodological aspects related to the development of variables can be found in the methods section of each paper. Table 4.4 and 4.5 present the distribution of dependent and independent variables - discussed in the next pages - for each study paper.

#### *Demographics and social characteristics variables*

Various variables related to the identification of households and individuals were available in the study dataset. Most of these variables were used as per NSS categorisation and are described in appendix 2. Age was recoded to create conceptually relevant categories. We selected 2 years, 18 years and 50 years as meaningful transition years with regards to health care needs. Obviously, other categorisation could have been relevant. Our study elected to limit the number of contrast categories to generate a parsimonious number of statistical tests. Scheduled caste and scheduled tribe were considered together.

Table 4.4 Distribution of dependent variables.

Dependent variables	Categories	Frequencies		
		Paper 1	Paper 2	Paper 3
Utilisation of outpatient care services (REF no utilisation)	Utilisation of outpatient care	343 (83%)		
	No utilisation	69 (17%)		
Utilisation of a private source of outpatient care (REF Public)	Private outpatient care utilisation	265 (77%)		
	Public outpatient care utilisation	78 (23%)		
Hospitalisation on a paying public ward or in a private hospital (REF Free public)	Hospitalisation in private hospitals		430 (62%)	
	Paying public wards hospitalisation		49 (7%)	
	Free public wards hospitalisation		216 (31%)	
	Continuous variable			682 (100%)

Table 4.5 Distribution of independent individual level variables

Independent variables	Categories	Frequencies		
		Paper 1	Paper 2	Paper 3
Age	Below 2 years old	33 (8%)	35 (5%)	35 (5%)
	2-17 years old	162 (39%)	110 (16%)	109 (16%)
	18-49 years old	159 (39%)	279 (40%)	270 (39%)
	50 years and older	58 (14%)	272 (39%)	272 (40%)
Sex	Female	203 (49%)	328 (47%)	326 (48%)
	Male	209 (51%)	366 (53%)	360 (52%)
Caste	Scheduled caste or tribe	31 (8%)	55 (8%)	55 (8%)
	Other castes	381 (93%)	636 (92%)	630 (92%)
Economic status	Poor (below poverty line)		162 (23%)	
	Very poor	28 (7%)		32 (5%)
	Moderately poor	62 (15%)		129 (19%)
	Non-poor (above poverty line)	322 (78%)		
	Middle class ()		436 (63%)	434 (63%)
	Rich (3X poverty line)		96 (14%)	91 (13%)
Employment status	Casual work	138 (34%)	265 (38%)	260 (38%)
	Non casual work	273 (67%)	428 (62%)	
	Self-employed			275 (40%)
	Regular wage/salaried			151 (22%)
Confinement to bed	Bedridden	117 (28%)		
	No confinement to bed	296 (72%)		
Previous hospitalisation	Previous hospitalisation	41 (10%)		
	No previous hospitalisation	371 (90%)		
Status of illness episode	Ongoing illness	150 (36%)		
	Illness resolved	262 (64%)		
Type of illness	Acute illnesses	395 (96%)	436 (63%)	431 (63%)
	Chronic diseases	18 (4%)	259 (37%)	254 (37%)
Duration of stay	7 days or less			420 (61%)
	More than 7 days			65 (39%)

*Economic status and poverty*

The NSS has been recognised as the most important and richest source for assessment of poverty and levels of living in India (Vaidyanathan, 2001; Deaton, 2003). The National Sample Survey Organisation conducts an extensive assessment of households' consumption expenditure. Consumption is measured for the last 30 days while accounts for the entire previous year is collected for other aspects of consumption. This approach seems a better approach than a single question about the overall consumption level of the household over the last month – which does not adequately represent the complexity of the notion of consumption – and a more feasible approach than accounting every expenditure items for the full year. Consumption expenditure measures have been recognised as better measure of economic status than reported income in developing countries. In such contexts, income measures are not appropriate for context with large informal sectors where regular wages are rare and various kinds of non monetary payments more frequent than in highly industrialised regions.

We have used the monthly household consumer expenditure measure provided and have divided it by the number of household members to calculate a monthly per capita consumption expenditure measure. Furthermore, in order to better reflect the economic status of households we have also calculated an adjusted monthly per capita, using the OECD equivalence scale. This scale attributes a weight of 1 to the first adult, 0.7 to subsequent adults and 0.5 to child in the households (OECD, 1982). The use of such equivalence scale in per capita consumption measures seeks to take into account the economies of scale experienced by larger households and tends to reduce the overestimation of poverty generated by per capita measures. In general, these measures generate estimates of poverty higher than those based on total household expenditure and lower than those based on per capita expenditure.

In this study, we have used a standard equivalence scale suggested for developing countries. Such measure has the advantage of being comparable between studies (Data International, 2001). Yet, these measures introduce an arbitrary weight to individuals and children and should be used with caution. In this study, the use of equivalence scale was

limited to the categorisation of very poor and moderately poor individuals and could not have interfered with the identification of poor households. The monthly per capita measure was used to identify poor and non poor households. The adjusted per capita measure was used to identify moderately poor and very poor households among the poor identified with the non adjusted per capita ranking. All measures were contrasted with the official poverty line suggested by the State Planning Board actualised for the year under study. This line is equivalent to 310 INR per capita per month. This official poverty line is an index of headcount based on the food-energy method. It amounts to the level of expenditure necessary to purchase a quantity of food sufficient to meet nutritional requirements (Deaton, 2003). The purpose of the norm is to help define a standard of consumption which is socially accepted as a minimum desirable and provides a common yardstick for comparisons across regions and of directions and relative rates of change in time (Vaidyanathan, 2001). For this study the poverty line of 1993-94 for urban Kerala (280.54 INR) - actualised to a level of 310 INR for 1995-96 - was employed. Figure 4.3 graphically summarizes the criteria used to classify households.

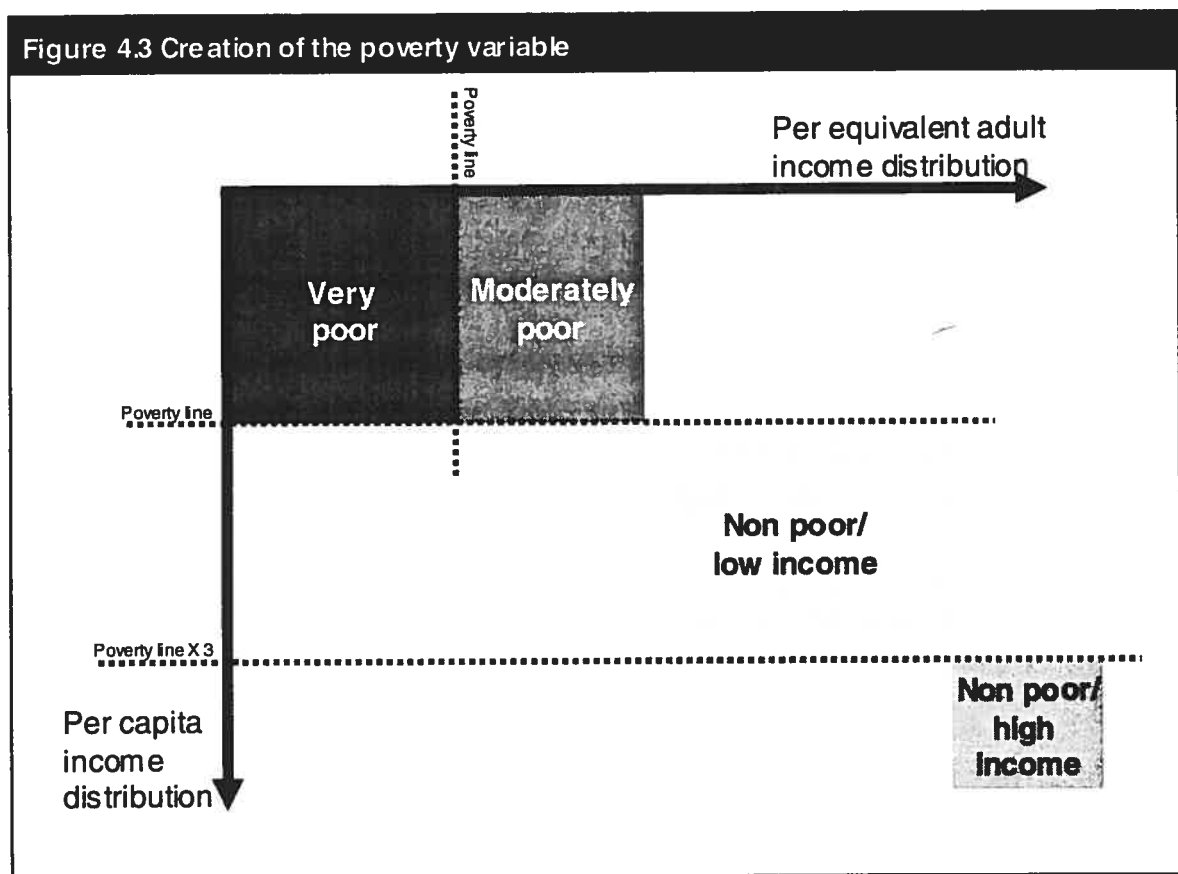
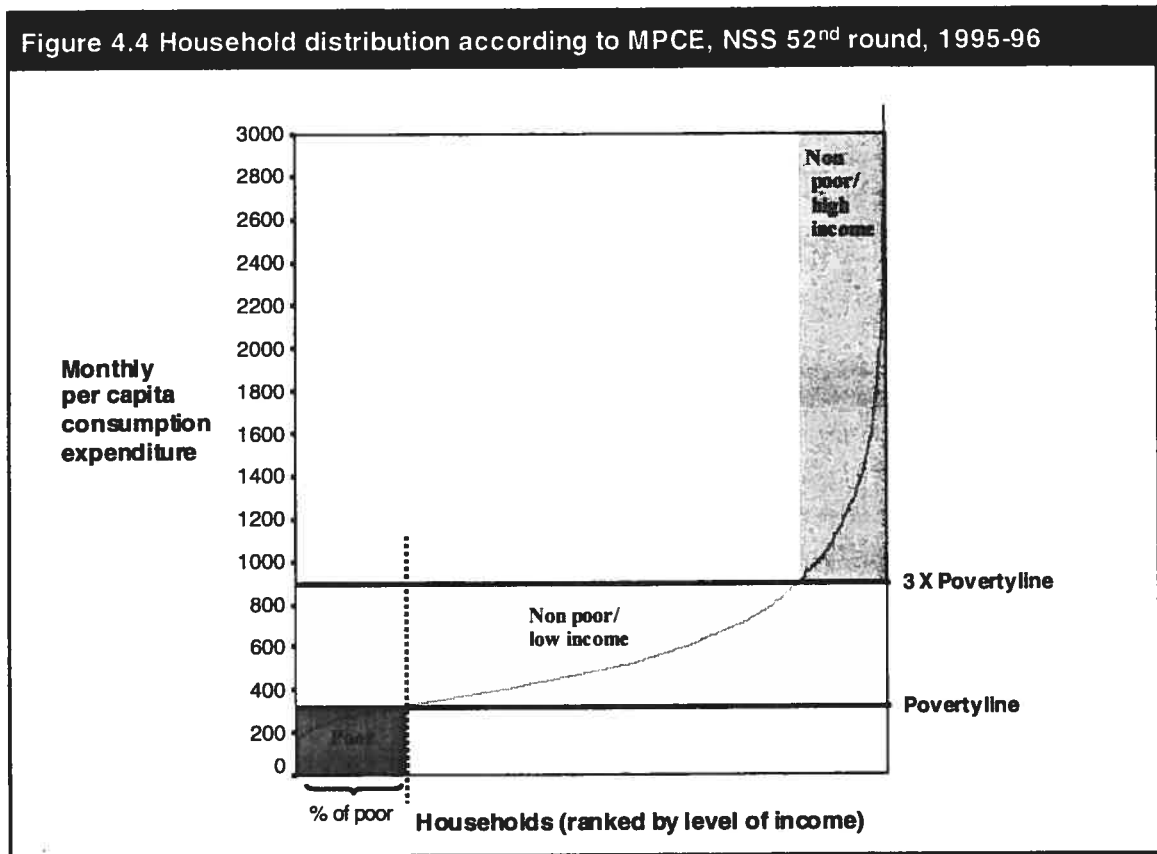


Figure 4.4 shows the cumulative distribution of household economic status and the three main economic groups under study. In Kerala since many individuals fall just below and just above the poverty line. As can be seen from this graph, the non poor category comprises a big portion of the sampled households.



In order to test the sensitivity of the identification of the very poor in our study to our use of an equivalence scale, we calculated the proportion of very poor using normative criteria of 75% the level of the poverty line suggested in the study by Radakrishna et al. (2004). That same study, using previous NSS data, suggested poverty headcounts for Kerala of 24.3% of poor (under the per capita poverty line) and 9.8% of very poor (less than 75% of poverty line) individuals in 1993-1994 compared to 19.9 and 6.2% in 1999-2000 (Radakrishna, Hanumantha, Rao, Ravi & Reddy, 2004). The poverty headcounts found for various parts of our analyses (Table 4.6) are in line with these results, following the similar trend in reduction over the years. From this table we can see that our identification of the very poor - using an adult equivalent scale - is more stringent than the 75% of the poverty line criteria. Other variables available for the assessment of living standards from the NSS were related to household assets, education and employment (Table A2.2 in appendix 2).

**Table 4.6 Poverty headcount index**

<b>Data files</b>	<b>Proportion of poor</b>	<b>Proportion of very poor (Adjusted)</b>	<b>Proportion of very poor (as 75% of PL)</b>
Individual sample	20.0%	3.6%	6%
Outpatient care sub sample	22.0%	6.9%	8.3%
Hospitalisation sub sample	20.5%	3.5%	5.9%

### *Controlling for the severity of illness*

Aspects of self-reported morbidity (acute and chronic illness and disability) were used as indicators of the health need required for assessing equality of utilization for equal need (Pannarunothai & Mills, 1997). Information provided in the NSSO survey differed according if it was applicable to the last 15 days or to hospitalisation cases during the last 365 days. For outpatient care analysis, the number of days of restriction of activity and the number of days of confinement to bed were combined to create a dichotomous variable related to the presence of severity criteria. For hospital care, numerous codes related to the type of illness causing the hospitalisation were grouped into 5 broad medically relevant categories, and into acute and chronic diseases according to the duration of the illness. The other information available to control for illness severity in hospitalisation and expenditure analyses was related to the duration of stay in hospital. This variable was used as a continuous variable as well as a dichotomous variable describing stays of one week or less and more than a week.

### *Urban level variables*

NSSO data provided information related to each urban block such as the size of the urban agglomeration to which the block belongs to and the district of origin. Using these two variables, all towns of more than 200,000 and most towns of 50,000 to 199,999 inhabitants were identified. Towns of less than 50,000 inhabitants could not be identified as were a few medium sized agglomerations when more than one was present in a district. For the purpose of the analyses in this study, we grouped together small towns from each districts -

forming 12 district wise clusters - and 5 pairs of medium towns. This enabled us to identify 24 urban units. Using these urban units, we created urban-level variables using data from the Census survey of Kerala, the census of public and private institutions and aggregation of variables from the NSS data file. We used district-wise information to identify units with medical colleges and computed bed densities in both the private and public sectors and ratios of private to public beds (Paper 1 and 2). The density of beds has been suggested as a good proxy of supply of services for Kerala (Kutty, 2000).

We completed this urban-level information with aggregation of information from the NSS database, using the complete sample of households and individuals. Using the information related to the 2078 households and 10374 individuals to create urban-level poverty, casual work and pucca housing prevalence consisted in good compromise in the absence of community-level data. The fact that the sub sample studied as part of this thesis are much smaller than the actual complete dataset reduces the endogeneity related to the use of aggregation of individuals for higher level information. Table 4.7 presents the distribution of urban level variables in our study.

Table 4.8 shows the 24 urban units with the respective proportion of the urban population of Kerala for their district of origin, the number of urban blocks surveyed and the proportion of outpatient care and hospital care sample from each unit. From this table, we can see the relatively good district-wise representation of the various sub samples, except for Kannur and Ernakulam districts which was slightly over represented and Allapuzha, Kollam and Thiruvananthapuram districts which were slightly under represented. The over representation of Ernakulam is especially large for hospitalisation. Further details information on the methodology used in this thesis is presented in each paper.



Table 4.7 Distribution of independent urban level variables\*

Independent variables	Categories	Frequencies	
		Paper 1 Uneven options for outpatient care	Paper 2 Insular pathways for inpatient care
Urban size	Small towns (<50,000 inhabitants)	254 (62%)	386 (56%)
	Medium town (50,000-199,999)	55 (13%)	73 (10%)
	Large town (200,000 or more)	104 (25%)	236 (34%)
Proportion of households below the poverty line	Low (below mean of districts)	253 (61%)	517 (74%)
	High (above mean of districts)	159 (39%)	178 (26%)
Proportion of households with casual work status	Low (below mean of districts)	344 (84%)	606 (87%)
	High (above mean of districts)	68 (16%)	89 (13%)
Proportion of households living in a <i>pucca</i> house	Low (below mean of districts)	41 (10%)	107 (15%)
	High (above mean of districts)	371 (90%)	588 (85%)
Density of public hospital beds (per 1000 population)	Low (below mean of districts)	56 (14%)	
	High (above mean of districts)	356 (86%)	
Density of private hospital beds (per 1000 population)	Low (below mean of districts)	173 (42%)	
	High (above mean of districts)	239 (58%)	
Presence of a medical college in the district	Yes		262 (38%)
	No		433 (62%)
Density of hospital beds (per 1000 population)	Low (below mean of districts)		147 (21%)
	High (above mean of districts)		548 (79%)
Ratio of private hospital beds to public hospital beds	Low (below mean of districts)		250 (36%)
	High (above mean of districts)		444 (64%)

\*Paper 3 did not use urban-level variables.

#### 4.4 Statistical analyses

##### *Descriptive statistics and bi-variate associations*

Bi-variate analysis for association between variables was assessed using Pearson's  $\chi^2$  test of association in cases of proportions, ANOVA comparisons of means and Kolmogorov-Smirnoff tests of distributions to assess differences in median values. Explanatory variables showing a significant association with dependant variables ( $p \leq 0.2$ ) were considered as

candidates for multiple regression models along with variables of known conceptual relevance (Hosmer and Lemeshow, 1989). This has been shown to be better than more stringent levels for inclusion which tended to discard significant variables.

Table 4.8 Description of urban units' samples.

Urban units [number in brackets]	% of urban Kerala <sup>1</sup>	Number of urban blocks	Individual sample n [%]	Outpatient care sample n [%]	Hospital care sample n [%]
Kasaragod district [1]	2.8%	1	41 [0.4%]	-	6 [0.9%]
Kasaragod/Kanghangad [13]		5	279 [2.7%]	3 [0.7%]	11 [1.6%]
Kannur district [2]	14.7%	23	1394 [13.5%]	39 [9.2%]	60 [8.7%]
Kannur/Thalassery [14]		9	628 [6.1%]	14 [3.3%]	22 [3.2%]
Kozhikode district [3]	13.3%	10	515 [5.0%]	26 [6.1%]	31 [4.5%]
Kozhikode/Beypore [15]		12	675 [6.5%]	25 [5.9%]	33 [4.8%]
Quilandi/Vadakara [16]		3	155 [1.5%]	1 [0.2%]	9 [1.3%]
Malapuram district [4]	4.3%	3	144 [1.4%]	3 [0.7%]	7 [1.0%]
Malapuram/Menjeri [17]		3	169 [1.6%]	6 [1.4%]	7 [1.0%]
Thrissur district [5]	10.1%	17	762 [7.4%]	24 [5.7%]	42 [6.1%]
Thrissur [18]		6	286 [2.8%]	14 [3.3%]	21 [3.0%]
Palakkad district [6]	4.3%	6	310 [3.0%]	19 [4.5%]	18 [2.6%]
Palakkad [19]		4	155 [1.5%]	20 [4.7%]	11 [1.6%]
Ernakulam district [7]	17.8%	22	998 [9.7%]	43 [10.2%]	88 [12.7%]
Kochi/Ernakulam [20]		31	1419 [13.8%]	62 [14.7%]	120 [17.4%]
Kottayam district [8]	3.6%	5	236 [2.3%]	36 [8.5%]	29 [4.2%]
Kottayam [21]		4	159 [1.5%]	17 [4.0%]	22 [3.2%]
Allapuzha district [9]	7.5%	4	177 [1.7%]	10 [2.4%]	10 [1.4%]
Allapuzha [22]		5	258 [2.5%]	8 [1.9%]	20 [2.9%]
Pathanamthitta district [10]	1.5%	7	310 [3.0%]	7 [1.7%]	20 [2.9%]
Kollam district [11]	5.6%	2	110 [1.1%]	7 [1.7%]	8 [1.2%]
Kollam [24]		4	191 [1.9%]	16 [3.8%]	29 [4.2%]
Thiruvananthapuram district [12]	13.2%	7	307 [3.0%]	8 [1.9%]	20 [2.9%]
Thiruvananthapuram [25]		14	636 [6.2%]	15 [3.5%]	47 [6.8%]

<sup>1</sup>As per Census 2001

### *Multilevel analysis*

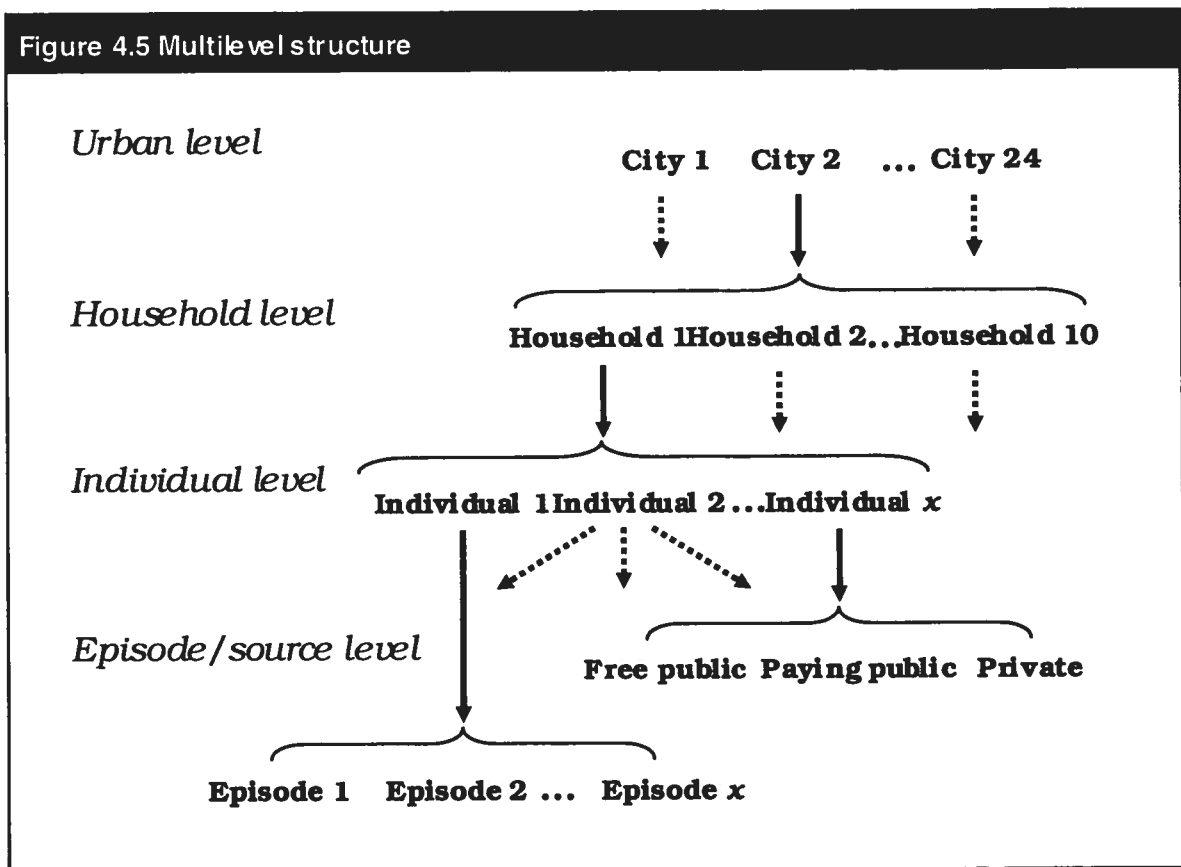
Multilevel models have recently received a lot of attention in the epidemiological and social sciences literature. These models have been used to imbricate in statistical analysis the clustering of lower level units into higher level units. This clustering has been shown to cause non-independence of lower level units and bias estimates of conventional multiple regression models. Multilevel models account for the non-independence of observation within groups and treat groups or contexts as being related, coming from a larger population of groups. Furthermore, these models have the advantage of providing information on the proportion of total variance in dependent variables arising from each levels of analysis, therefore providing relevant knowledge on the principal determinants of such outcomes. Finally, they permit the introduction of explanatory variables at each level of analysis and allow for the simultaneous examination of effects of group-level and individual-level predictors. With multilevel modelling, both variations between individuals and groups can be examined, as well as the contributions of individual-level and group-level variables to these variations (Diez-Roux, 2000). Further theoretical discussion about multilevel modelling can be found in appendix 3.

In the first paper, multilevel logistic regressions (with binomial link function) were used to model utilisation (vs. non utilisation) of outpatient care services among those reporting an illness episode and utilisation of private (vs. public) providers as source of outpatient care (Afigure A4.1 and A4.2 in appendix). These logistic models were performed using a 2-levels structure: urban level and individual level.

In the second paper, multinomial regression (with multinomial link function) was used to model source of hospital care using the three response categories variable developed (free public hospitalisation, paying public hospitalisation and private hospitalisation) (Figure A4.3 in appendix). Multinomial regressions were done using a 3 level structure: urban level, individual level and source of care level.

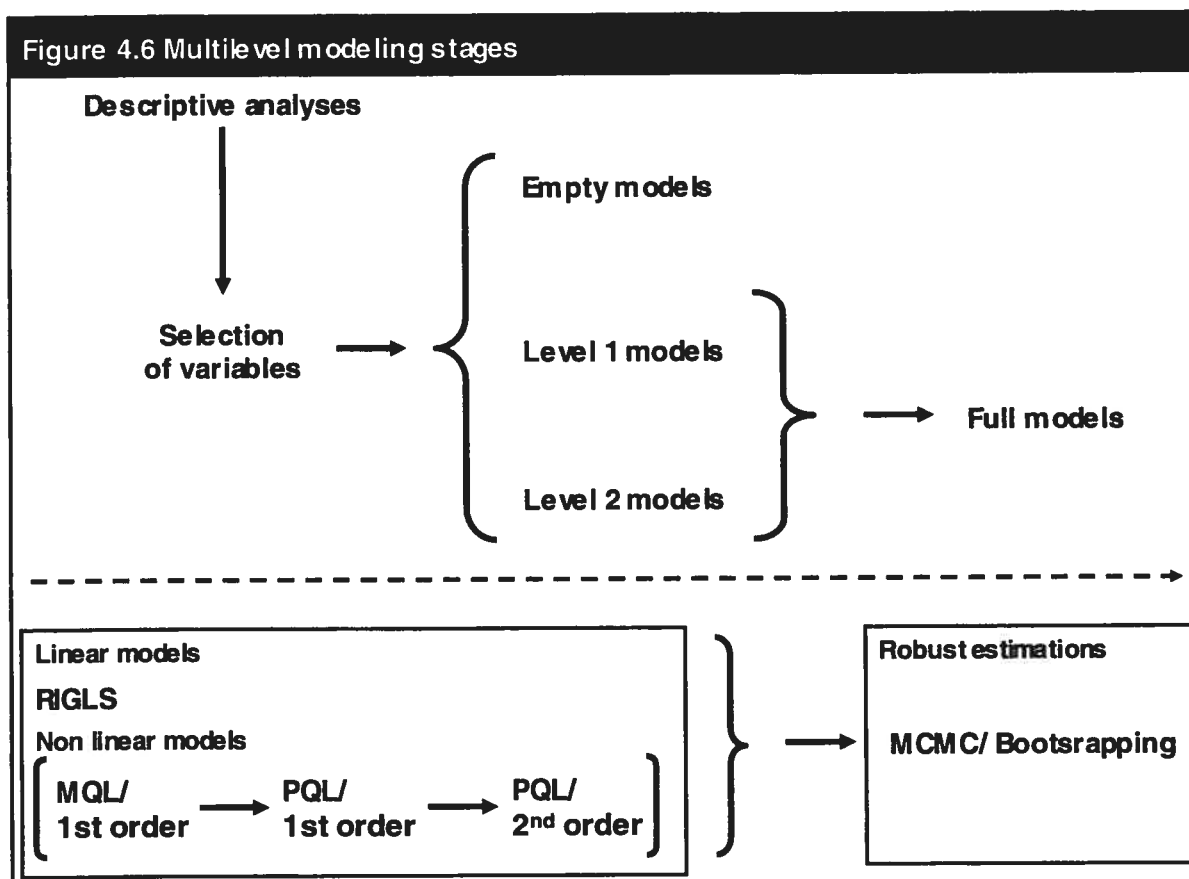
In the third paper, linear regression of total health care costs and multivariate regression of medical expenditure bought from the hospital and bought from outside the hospital were

built to assess determinants of health care expenditures (Figure A4.4, A4.5 and A4.6 in appendix). Linear regressions of health expenditure used a 2-level structure using the individual and episode levels. Figure 4.5 presents the overall nesting structure found in the study. Because of very few numbers of households having more than one person ill (15 days) or hospitalised (365 days) during the recall periods, household and individual levels were merged in all analysis.



We have developed multiple regression models by a four steps strategy (Figure 4.6). We started by an empty model containing an intercept and error terms at each levels and no explanatory variables. The second stage involved the introduction of level-1 predictors. The third stage involved the introduction of level-2 predictors. The final stage consisted in building a full model containing both level-1 and level-2 predictors. Variables were excluded at each model-building step if non-statistically significant (using the Wald test) and if their presence or absence did not influence other coefficients. Likelihood ratio tests were performed to guide the model development and assess the strength of models at

different stages. Such a stepwise method has been shown to be useful in developing parsimonious models - avoiding over parameterization of the model - with good predictive ability (Hosmer and Lemeshow, 1989; Neter, Kutner, Nachtsheim & Wasserman, 1996). All models were performed using the Restricted Iterative Generalized Least Square function to provide appropriate regression coefficients appropriate for the study's sample sizes. In addition, non linear models were built using the stepwise approach suggested by Goldstein (2003) starting with 1<sup>st</sup> order Marginal Quasi Likelihood to 2<sup>nd</sup> order Penalized Quasi Likelihood models. Finally, Markov-Chain Monte-Carlo and Bootstrap re-sampling methods were used to provide robust estimates in all models. OLS values were used as replicate starting values (5 sets of 100 replicates with a maximum of 25 iterations per replicate). Residuals were examined for each model to assess departure from linear distribution and presence of outliers. Level 2 standardised residuals were plotted to assess remaining heterogeneity at level 2. Models were developed with MlwiN 2.0 software.



### ***Nonparametric regression***

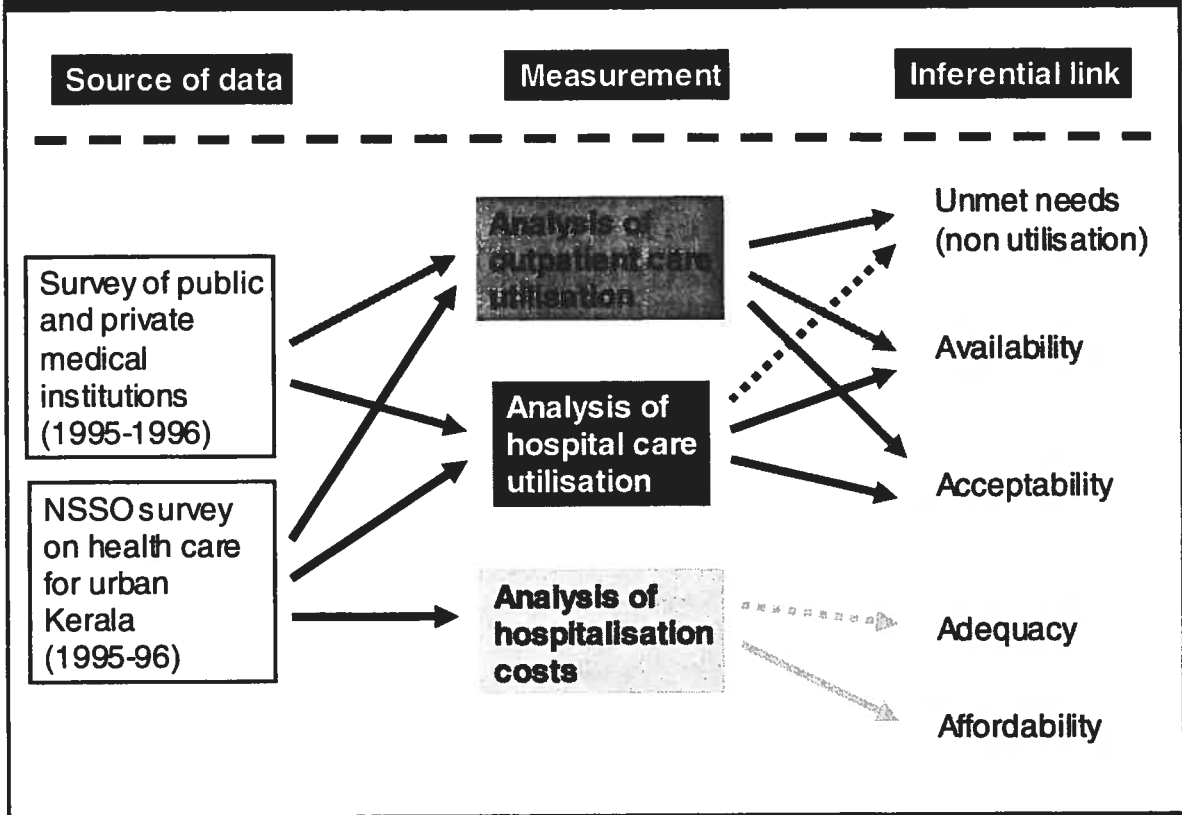
Non parametric regressions of total health care expenditure and proportion of monthly household consumption expenditure by monthly consumption expenditure and per capita consumption expenditure were realized using DAD 4.2 software (Duclos, Araar & Fortin, 2003). All curves used a range of 200-700 and a smoothing of 100 (optimal at 75). Observations below 200 INR or above 700 INR of per capita monthly consumption expenditure were excluded from non parametric analysis since there was a skewed distribution of data and smaller sample size at these levels, creating instability of the regression lines. These results will be presentation in the discussion section.

### ***General Linear Model***

In order to assess the statistical significance of means of health care expenditure, we built General Linear Models (Univariate - Weighted) for each dependent variable. This enabled us to model the average medical expenditure bought from the hospital, medical expenditure bought from outside the hospital, the other direct medical expenditure, the indirect expenditure and total health care expenditure for relevant independent factors. All outlier cases of expenditure were recoded at the 95<sup>th</sup> percentile value to reduce the influence of extreme values on the analysis of variance. The model included the economic status, hospitalisation type, illness type and duration of hospitalisation variables, as well as an interaction term between economic status and illness type. Type III SUM of squares with intercept in the model was used. Homogeneity test and lack of fit test was performed. All multiple contrasts of means and confidence intervals were corrected using the Scheffé and Tuckey statistics for correction of multiplicity of tests. All GLM were performed using SPSS 11.5 (SPSS, 2002). The results of these analyses are presented in the discussion section.

Figure 4.7 illustrates the source of data, measurement strategy and inferential link with dimensions of access covered through this thesis. While some links are more direct assessment (full line) others provide only indirect evidence (dotted line). As can be seen, the three papers will contribute to the understanding of various dimensions of access.

Figure 4.7 Thesis analytical components and related access dimensions



## 5 RESULTS

This section will present the study's results. It consists of three papers presenting three separate analyses of the NSS data for urban Kerala. The first paper presents analyses and discussion of results on outpatient care. It includes a description and multiple logistic regressions of factors associated with outpatient care utilisation and source of outpatient care in urban Kerala.

The second paper discusses hospitalisations in urban Kerala. It includes a description of inpatient care processes and multinomial regression modelling of sources of inpatient care.

The third paper presents analyses of health care expenditure for hospitalisations in urban Kerala. It includes a description of expenditure according to various types of expenditure and sources of hospitalisation and multiple regressions of factors of factors related to level of hospitalisation expenditure. Complementary analyses results will be referred to in the discussion section of this thesis.

Jean-Frédéric Levesque has acted as principal investigator throughout the conduction of this study. He is responsible for the leadership in the conception and design of the study, analysis and interpretation of the data. As first author of each paper, He is responsible for the drafting, revision, finalisation and submission of the papers presented in this thesis. He accepts full responsibility for the papers' intellectual contents and the ideas expressed in this thesis.



# Outpatient care utilization in urban Kerala, India

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## Outpatient care utilization in urban Kerala, India

Jean-Frédéric Levesque, Slim Haddad, D Narayana and Pierre Fournier

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### SUMMARY

**CONTEXT:** Kerala is characterized by a high density of public and private health infrastructure. While less inequality in access has been reported in this Indian state, few studies have looked at problems found within cities. Escalation of costs of private services and reduced public investments could generate some inequalities in access for the poor.

**OBJECTIVE:** To assess factors associated with utilization and source of outpatient care in urban Kerala and discuss policy implications with regards to access to care.

**METHODS:** A multilevel analysis of individual and urban characteristics associated with utilization and source of outpatient care was conducted using data from a 1995-96 survey by the National Sample Survey Organisation on health care in urban Kerala.

**FINDINGS:** There is a high level of utilization (83.6%) of allopathic medical services. Controlling for illness severity and age, utilization thereof was lower for the very poor (OR 0.13 [0.03; 0.49]), inhabitants of medium towns (OR 0.20 [0.05; 0.7]), and inhabitants of cities with lower proportion of permanent material (*pucca*) houses (0.21 [0.06; 0.72]). Among all users, 77% resorted to a private source of care. Utilization of a private provider was less likely for the very poor (OR 0.13 [0.03; 0.51]) and individuals from casual worker households (OR 0.54 [0.30; 0.97]), while it was more likely for inhabitants of cities from both low public bed density districts (OR 4.08 [1.05; 15.95]) and high private bed density districts (OR 5.83 [2.34; 14.53]). Problems of quality and accessibility of the public sector were invoked to justify utilization of private clinics. A marked heterogeneity in utilization of outpatient care was found between cities of various sizes and characteristics.

**CONCLUSION:** This study confirms high utilization of private outpatient care in Kerala and suggests problems of access for the poorest. Even in a context of high public availability and considering the health transition factor, relying on the development of the private sector to respond to increasing health care needs could create inequalities in access. Investing in the public urban primary care system and ensuring access to quality health care for the poorest is warranted.

**Keywords:** access to health care; poverty; developing countries; primary health care; urban health

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### Introduction

Urban areas in developing countries generally show better health indicators and have more health facilities than rural areas. Their populations tend to benefit from higher economic status, enjoy better living conditions and better access to health care. However, several studies have demonstrated that urban health care facilities often benefit only an affluent minority and that widespread socio-economic inequalities result in major health disparities (Cairncross et al. 1990; Rossi-Espagnet et al. 1991; WHO 1993; Harpham and Tanner 1995; Sclar et al. 2005; Vlahov et al. 2005). Access to care is hampered by the prevalence of costly specialised services so the poor are left with fewer affordable care options. Wide differentials in access to care have been observed in large cities (Satterthwaite 1998).

However less is known about the gaps in access to care in small and medium towns (Harpham and Tanner 1995), where most of the urban population resides and where growth is outpacing that of larger agglomerations (United Nations 2004). Increasing urbanization and widening inequalities, unmatched by the development of affordable services, could lead to restrictions in access to care and higher propensity to resort to self-treatment among the poor (Castro-Leal et al. 2000).

Despite slow economic growth and low per capita income, Kerala has attained notable achievements in the field of health (Franke and Chasin 1992; Thankappan and Valiathan 1998). This was accomplished with an emphasis on education and basic health care services and in a context of lesser socioeconomic inequalities (Panikar and Soman 1975; Drèze and Sen 2002). Kerala - one of the smallest and most densely populated states in India - has a level of urbanization of 35%; it is characterised by the predominance of small and medium towns (Sreekumar 1993), with thirteen of its urban agglomerations respectively numbering 100 000 to 1.3 million inhabitants (Census of India 2001).

Kerala has the highest density of public and private medical facilities among major states in India (Government of India 2003). Its highly developed public health care system comprises medical colleges, district and local hospitals and primary health centres (PHC) and subcenters. The system is decentralized and most public sector medical institutions are located in rural areas (Narayana and Hari Kurup 2000). The allopathic system also comprises a large private sector, run by for-profit (e.g. general practitioners, private hospitals and dispensaries, registered medical practitioners) and not-for-profit providers (e.g. voluntary health programmes, charitable institutions, missions, churches and trusts). The private sector is prominent as it concentrates the large majority of the State's doctors (86%) and hospitals (82%); furthermore, 58% of hospital beds (found both in hospitals and physicians' offices) are in the private rather than in the public sector (Kutty 2000; Varatharajan et al 2002). A large private informal sector complements the offering of services (e.g. practitioners without formal training, faith healers, herbalists, priests) (Bhat 1993,1999).

Kerala is known for its very high rates of perceived morbidity (Kunhikannan and Aravindan 2000) and utilization of health services in the context of its health transition (Panikar 1998; Kannan et al. 1991). Studies have shown that utilization of private services has reached considerable levels in Kerala (Krishnan 2000; Kunhikannan and Aravindan 2000; Narayana 2001), even among the poor (Kannan et al. 1991), especially where outpatient care services are concerned (Mahal et al. 2001). Yet, problems of access to care have been documented: the poor face the greatest barriers to medical services (Krishnan 2000) and, in situation of need, they more often refrain from seeking medical help (Pillai and al. 2003). As in other parts of India, primary health care needs remain poorly addressed in urban Kerala. The relative lack of governmental PHCs (although they abound in rural areas) could promote high levels of utilization of public hospitals and private providers for outpatient care needs (Varatharajan et al. 2004).

Public and private services have been reported to vary in quality from one institution to the other in Kerala (Narayana 2001). The widespread lack of adequate personnel, diagnostic tests, therapeutic equipment and medication, has been documented in public hospitals (Varatharajan et al. 2002). These quality-related problems could decrease the effective availability of curative care in the public system. Households' spending for both public and private services has been shown to be high and rising rapidly in Kerala (Narayana 2001). In a context of high density of private services, very low levels of health insurance coverage and poor quality of public services, access to quality care can be determined by the economic situation of potential users (Nabae 2003).

The limited number of studies looking at access to health care in urban Kerala leaves many questions unanswered. What is the poorest's situation with regards to access to health care? Do urban dwellers, regardless of their economic status, choose equally between the range of public and private providers? Which urban characteristics are more conducive to access to care? This study aims to analyse the determinants of utilization of outpatient (i.e. care received on an ambulatory basis, not involving spending a night in hospital) health care services in urban Kerala and their implications with regards to access to care.

## Conceptual background

In this study, access is defined as the opportunity to reach and obtain appropriate health care services. Access results from the interface between the characteristics of persons, households, social and physical environments and the characteristics of health systems and organisations (Penchansky and Thomas 1981). Factors to consider in the assessment of access could thus pertain to *supply-side* features of health systems and organizations, to *demand-side* features of populations, and to *process* factors describing the ways in which access is realised (Daniels 1982). Within this conceptualisation, measuring utilization (the actual quantity of health care services and procedures used) (Shengelia et al. 2003) and non-utilization in the face of perceived need for services and severity of illness enables inferences about potential access to care (Waters 2000).

Recent studies have suggested that community characteristics - in addition to individual and household idiosyncrasies and to the overall availability of health services - could be significant determinants of utilization (McDade and Adair 2001; Ecob and Macintyre 2000). Enabling factors or barriers could pertain to both households and social environment (Andersen 1995; Unschuld 1975) and the care that individuals consume thus being a function of their demographic, social and economic characteristics as well as those of the health systems (Haddad and Fournier 1995).

Individuals are affected by social, cultural, economic or physical factors and studies on health care- seeking behaviour need to emphasise structural constraints as well as personal choices (Duncan et al. 1996; Ecob and Macintyre 2000). Structural effects could cause people with similar individual attributes to have different access to health care across geographical and social contexts (Curtis and Jones, 1998). The interaction between these factors and household and individual characteristics would generate ability to reach facilities and opportunity to choose (i.e. not being constrained to a single option). Few studies have looked at the interactions of individual, household, and community level characteristics to explain inequalities in access in cities of developing countries.

## Methods

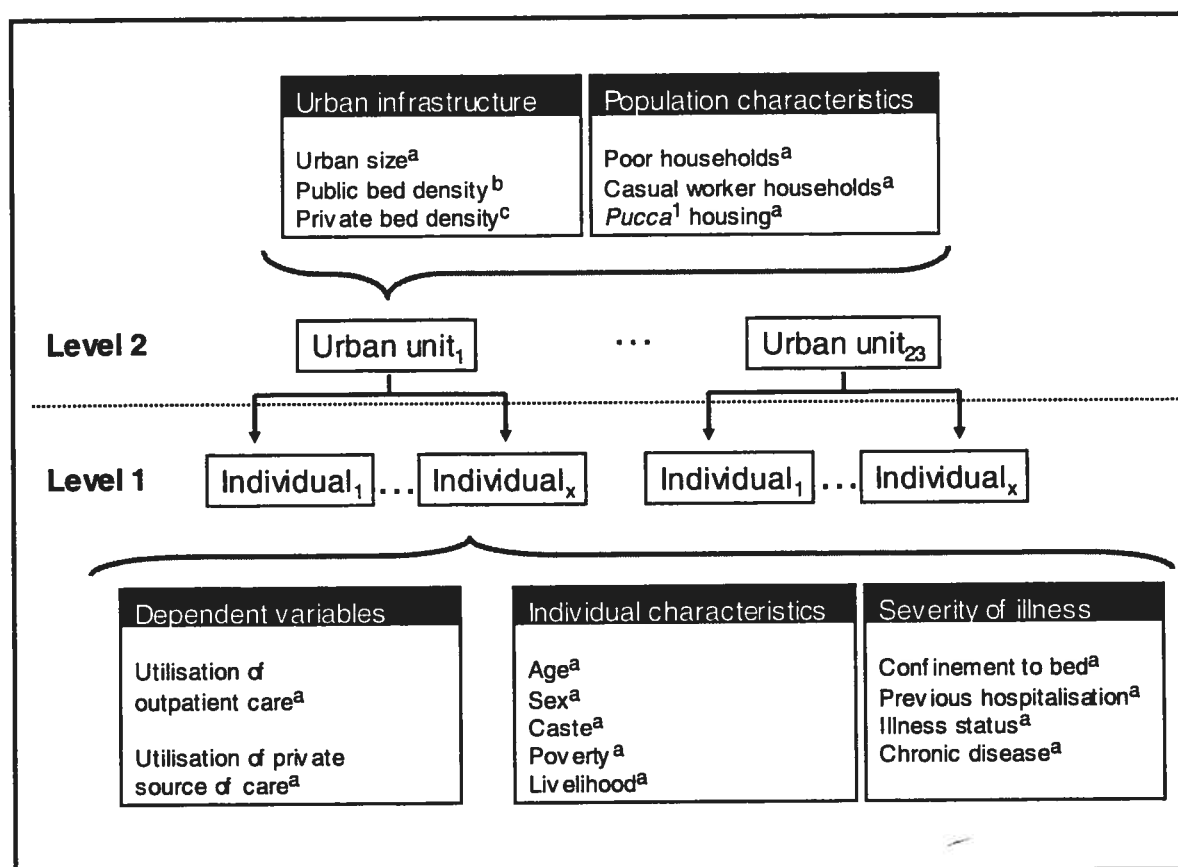
We analysed data on urban Kerala from a population survey conducted by the National Sample Survey Organization in 1995 and 1996 (NSSO 1996). The stratified sampling randomly selected census urban blocks (neighbourhoods of approximately 250 households) in the first stage. During the second stage, 10 households were randomly selected in each block with an over-sampling of households with young infants (2 households) and those reporting at least one hospitalisation over the previous year (2 households). Weights used to correct for this stratified sampling were provided by the NSSO. Information was collected about every individual in the household by interviewing its head or another adult. The standardized questionnaire covered items pertaining to perceived morbidity, utilization of health services, and individual and household characteristics. Information was gathered from 10,314 individuals living in 2,078 households nested in 208 urban blocks; the data collection was also distributed equally throughout the year to avoid bias resulting from seasonal variations in morbidity. Our analysis includes individual- and urban-level variables related to demand and supply, our purpose being if and how such variables are associated with utilization of health services (vs. non-utilization) and private source of care (vs. public) (c.f. figure 1) for persons reporting an illness episode during the 15-day period prior to the survey. For those declaring more than one source of care, the most recent was considered for analysis.

The economic status measure provided in the NSS is the household consumption expenditure. Households with a monthly per capita consumption expenditure (MPCE) below the official poverty line of 310 Rupees (about 7 US dollars) per capita per month were considered as being *poor*.<sup>1</sup> We also calculated the adjusted per capita consumption expenditure using the OECD equivalence scale (OECD 1982) to take into account economies related to household size and composition.<sup>2</sup> Poor households rising above the poverty line after adjustment were identified as *moderately poor*, those remaining under the poverty line after adjustment were considered *very poor*.

NSSO data provided non-nominal information on the urban areas surveyed. To create the urban-level variables, we used the available information about the district of origin and urban size to nominally identify cities. Due to the lack of information in the NSSO file,

towns of less than 50,000 inhabitants could not be identified and have been grouped by districts. We created three variables related to the level of urban infrastructure and three variables related to the characteristics of populations (c.f. figure 1). Appendices 1 and 2 describe the variables used and the sample size for each variable category.

**Figure 1.** Source of data and variables



### *Data analysis*

Associations between supply- and demand-side variables and dependent variables were assessed through multilevel modelling.<sup>3</sup> Data were hierarchically organised, all individual level information nested within urban units. All descriptive, bivariate and multiple regression analyses were weighted by the inverse of the sampling fraction to correct for the stratified sampling. Variables with more than 10% missing data were excluded. Variables presenting a statistically significant association ( $\chi^2$  value at  $p < 0.20$ ) with the dependent variables were entered in multiple regression models. Multilevel logistic regressions<sup>4</sup> were

used to model utilization (vs. non utilization) of health care services among those reporting an illness episode<sup>5</sup> and utilization of private (vs. public) providers as source of care. The final models were built by running models of increasing complexity.<sup>6</sup> Variables were excluded at each model-building step if non-statistically significant and if their presence did not alter other coefficients. The intra-class correlation was estimated using the formulae suggested by Snijders and Bosker (1999). A parsimonious number of variables were tested to avoid over-parameterization of the models. Descriptive and bivariate analyses were performed with SPSS version 11.5 (SPSS 2002). All multiple regression models were performed with MLwiN 1.10 and 2.0 (MLwiN 2003).

## Results

### *Sample characteristics*

Among the NSS urban Kerala sample, 423 individuals reported an illness episode within the 15 days prior to the survey. These individuals belonged to 312 households nested in 23 cities. Scheduled caste or tribe households represented 7.5% of the sample while 22.0% of individuals were from poor households (13.1% *moderately poor* and 6.9% *very poor*). Our urban-level sample includes 5 large cities, 7 medium towns and 11 small town district areas. Table 1 presents characteristics of each urban unit.

In bivariate analyses, more illnesses were reported at both ends of the age range: 14.7% below 2 years old; 11.5% from 2 to 5; 7.1% from 6 to 17; 6.6% between 18 and 49; and 14.5% 50 years and older ( $\chi^2$   $p < 0.05$ ). Gender, caste or economic group did not account for any differences in illness reporting. Severity of illness (as measured by restriction of activity and confinement to bed) was not gender-related; however it was associated with age (the younger and older showing lower severity) and caste (scheduled caste showing higher severity than other castes). Poor individuals (especially the very poor) reported higher severity than their better-off counterparts ( $\chi^2$   $p < 0.05$ ).



**Table 1.** Description of urban contexts

Urban units <sup>a</sup>	Urban size	Proportion of poor	Proportion of casual worker	Proportion of pucca housing	Presence of a medical college	Bed density <sup>b</sup> public	Bed density <sup>b</sup> private
Kasaragod/ Kanghai	Medium	63 [+]	68 [+]	88	no	79 [low]	122 [low]
Kannur district	Small	23 [+]	45	74	no	104	182 [low]
Kannur/Thalassery	Medium	13 [+]	29	85	yes	104	182 [low]
Kozhikode district	Small	16 [+]	55 [+]	83	no	177	155 [low]
Quilandi/Vadakara	Medium	13 [+]	64 [+]	70	no	177	155 [low]
Kozhikode/Beyppore	Large	9	42	89	yes	177	155 [low]
Malappuram district	Small	5	60 [+]	81	no	77 [low]	128 [low]
Malappuram/Menjeri	Medium	0	50 [+]	83	no	77 [low]	128 [low]
Thrissur district	Small	7	43	86	no	159	325
Thrissur	Large	10	18	87	yes	159	325
Palakkad district	Small	8	44	48 [-]	no	94 [low]	94 [low]
Palakkad	Medium	0	55 [+]	97	no	94 [low]	94 [low]
Ernakulam district	Small	11	35	89	no	150	412
Kochi/Ernakulam	Large	8	37	95	yes	150	412
Kottayam district	Small	33 [+]	36	84	no	202	432
Kottayam	Medium	5	41	95	yes	202	432
Allapuzha district	Small	31 [+]	49	96	no	208	192 [low]
Allapuzha	Medium	10	50	74	yes	208	192 [low]
Pathanamthitta district	Small	8	37	90	no	96 [low]	378
Kollam district	Small	5	55 [+]	86	no	97 [low]	312
Kollam	Large	0	33	39 [-]	no	97 [low]	312
Thiruvananthapuram district	Small	11	54 [+]	62 [-]	no	250	177 [low]
Thiruvananthapuram	Large	10	29	65 [-]	yes	250	177 [low]

<sup>a</sup> The term district describes a grouping of small towns in one district

<sup>b</sup> Number of beds per *lakh* population (100,000 persons) at the district level  
[+] denotes above the districts mean; [-] denotes below the districts mean

**Table 2.** Associations (weighted) of study variables with utilization of outpatient care services and choice of private source of outpatient care.

Dependent variables		Utilization of outpatient care (n <sub>i</sub> = 423)	Choice of private source (n <sub>i</sub> = 365)
Illness characteristics	Bedridden	93.2 % <sup>1</sup>	73.1 % <sup>2</sup>
	No confinement to bed	79.3 % <sup>1</sup>	79.5 % <sup>2</sup>
	Previous hospitalisation	95.1 % <sup>1</sup>	78.9 %
	No previous hospitalisation	81.9 % <sup>1</sup>	77.3 %
	Ongoing illness	89.3 % <sup>1</sup>	73.1 % <sup>2</sup>
	Illness resolved	79.5 % <sup>1</sup>	80.3 % <sup>2</sup>
	Acute illness	82.5 % <sup>2</sup>	77.5 %
	Chronic illness	100.0 % <sup>2</sup>	72.2 %
Age	Below 2 years old	93.9 % <sup>1</sup>	93.5 % <sup>1</sup>
	2-17 years old	91.4 % <sup>1</sup>	76.4 % <sup>1</sup>
	18-49 years old	74.8 % <sup>1</sup>	76.5 % <sup>1</sup>
	50 years and older	78.0 % <sup>1</sup>	71.1 % <sup>1</sup>
Sex	Female	81.8 %	77.1 %
	Male	84.7 %	77.4 %
Caste	Scheduled castes/tribes	83.9 %	61.5 % <sup>1</sup>
	Other castes	83.0 %	78.5 % <sup>1</sup>
Poverty status	Very poor	42.9 % <sup>1</sup>	41.7 % <sup>1</sup>
	Moderately poor	87.3 % <sup>1</sup>	70.4 % <sup>1</sup>
	Non poor	86.0 % <sup>1</sup>	80.4 % <sup>1</sup>
Employment	Casual work	79.7 %	68.8 % <sup>1</sup>
	Non casual work	84.6 %	81.4 % <sup>1</sup>
Urban size	Small towns	83.1 %	74.9 %
	Medium towns	77.0 %	85.1 %
	Large towns	87.6 %	79.1 %
District bed density	Low public bed density	75.4 % <sup>2</sup>	88.4 % <sup>2</sup>
	High public bed density	84.3 % <sup>2</sup>	76.0 % <sup>2</sup>
	Low private bed density	82.7 %	65.0 % <sup>1</sup>
	High private bed density	83.7 %	86.4 % <sup>1</sup>
Population characteristics	High below poverty population	79.9 % <sup>2</sup>	70.9 % <sup>1</sup>
	Low below poverty population	85.4 % <sup>2</sup>	81.0 % <sup>1</sup>
	High casual worker population	76.5 % <sup>2</sup>	78.8 %
	Low casual worker	84.3 % <sup>2</sup>	77.2 %
	Low proportion of <i>pucca</i>	75.6 % <sup>2</sup>	70.0 %
	High proportion of <i>pucca</i>	84.1 % <sup>2</sup>	78.2 %

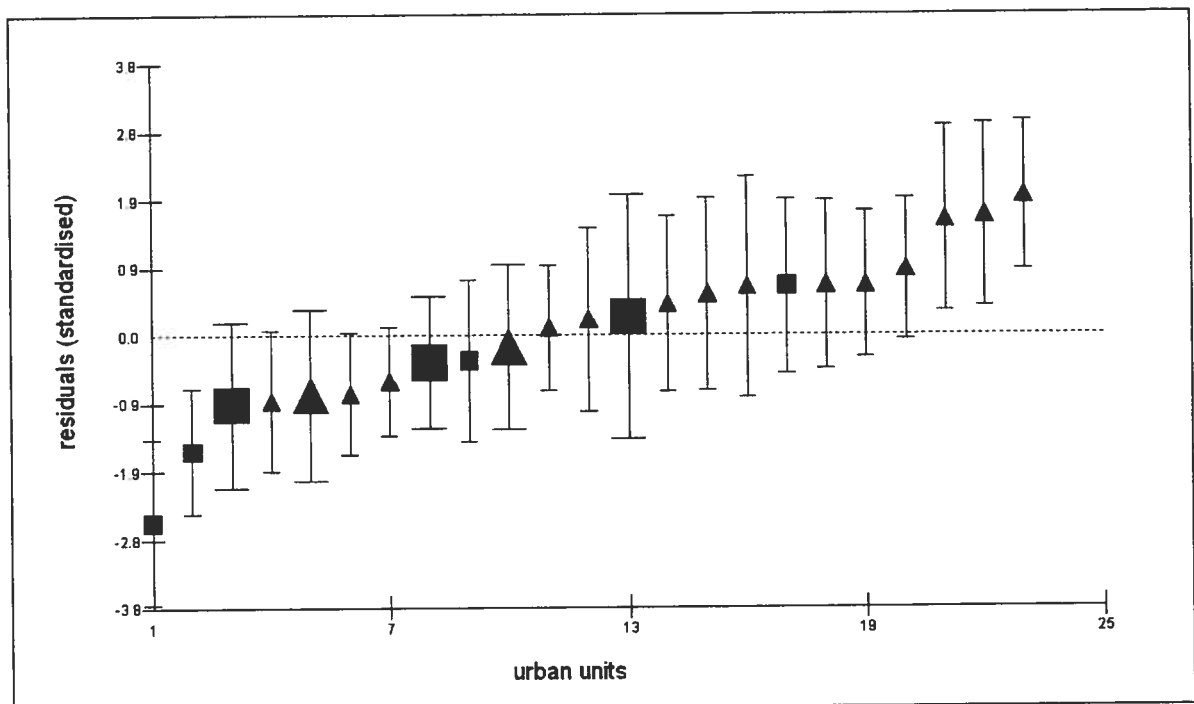
<sup>1</sup> Pearson's  $\chi^2$  statistics  $p \leq 0.05$ ; <sup>2</sup> Pearson's  $\chi^2$  statistics  $p \leq 0.20$

### Utilization of outpatient care services

Among the ill, 83.6% reported utilization of outpatient services. Among non users, most (85%) suggested the illness did not warrant recourse to health care. Financial reasons and absence of medical facilities in the neighbourhood explained the remaining cases of forgone utilization. Table 2 describes associations of individual- and urban-level variables with utilization of services.

Multilevel modelling of outpatient services utilization showed a significant variance between urban units ( $p < 0.05$ ; average of 85% of utilization with plausible value range across units of [42%; 98%]). The dispersion of residuals (presented in Figure 2) shows this variability in utilization across urban units. Medium towns and urban areas with high proportion of poor residents are mostly found in urban units with lower levels of utilization.

**Figure 2.** Standardised residuals departure from the mean utilization across urban units (ranked).



Legend: High proportion of poor cities (large symbols) Low proportion of poor cities (small symbols);  
 Medium towns (squares) Small and Large towns (triangles).  
 90% confidence intervals of departure of residuals from the mean shown for each urban context

People having been confined to bed during their illness (bedridden), those still ill at the time the survey was conducted (ongoing) and the younger respondents were more likely to have utilised medical services (Table 3). The likelihood of using any service whatsoever is significantly lower among the *very poor*, inhabitants from medium size towns and from urban units with a lower proportion of *pucca*<sup>7</sup> housing. Approximately 26% of the total variance was attributable to the urban-level, the rest being due to individual variables. The introduction of level-2 variables has led to a 44% reduction in the variance initially observed between urban units. Nonetheless, significant urban-level variance in the final model ( $p < 0.05$ ) suggests unexplained variations remaining in the data at the urban level.

**Table 3.** Utilization of health care services ( $N_j = 23$ ;  $N_i = 423$ ). Logistic regression: parameter estimates; standard errors. (Binomial logit; Weighted; 2<sup>nd</sup> order Penalized Quasi Likelihood)

Fixed effects*	OR	95% C.I.
<b>Severity</b>		
Bedridden (REF = No confinement to bed)	7.93	3.6-17.2
Ongoing episode (REF = Episode ended)	3.77	1.8-7.9
<b>Individual characteristics</b>		
Age (REF = 18 years and older)		
Below 18 years old	4.63	1.6-13.1
Poverty (REF = Non poor)		
Very poor	0.13	0.03-0.49
Moderately poor	1.00	0.38-2.6
<b>Urban contexts characteristics</b>		
Urban size (REF = Small towns)		
Medium towns	0.20	0.05-0.7
Large towns	1.13	0.20-6.62
Poor neighbourhood (REF = Non poor)	0.41	0.15-1.13
Low pucca housing (REF = High pucca)	0.21	0.06-0.72
Random effects	Variance	SE
Level 2	0.965**	0.329
Intra-class correlation (empty model)	0.26	
Intra-class correlation (final model)	0.20	

\* Variables PREVIOUS HOSPITALIZATION, CHRONIC ILLNESS, PUBLIC BED DENSITY and PRIVATE BED DENSITY were excluded from the final model.

\*\*  $p \leq 0.05$

*Choice of public or private provider analyses*

Among users, 77% resorted to a private source of care. Only 2.3% had consulted more than one source of care. Most respondents explained their choice of a private provider by their dissatisfaction with previous treatments, problems of access in the public sector and/or the higher availability of private providers. Among the poor, the latter reason is even more prominent (Table 4). The last column in table 2 shows the association of independent variables with utilization of private source of care.

**Table 4.** Reasons expressed for utilizing a private source of care

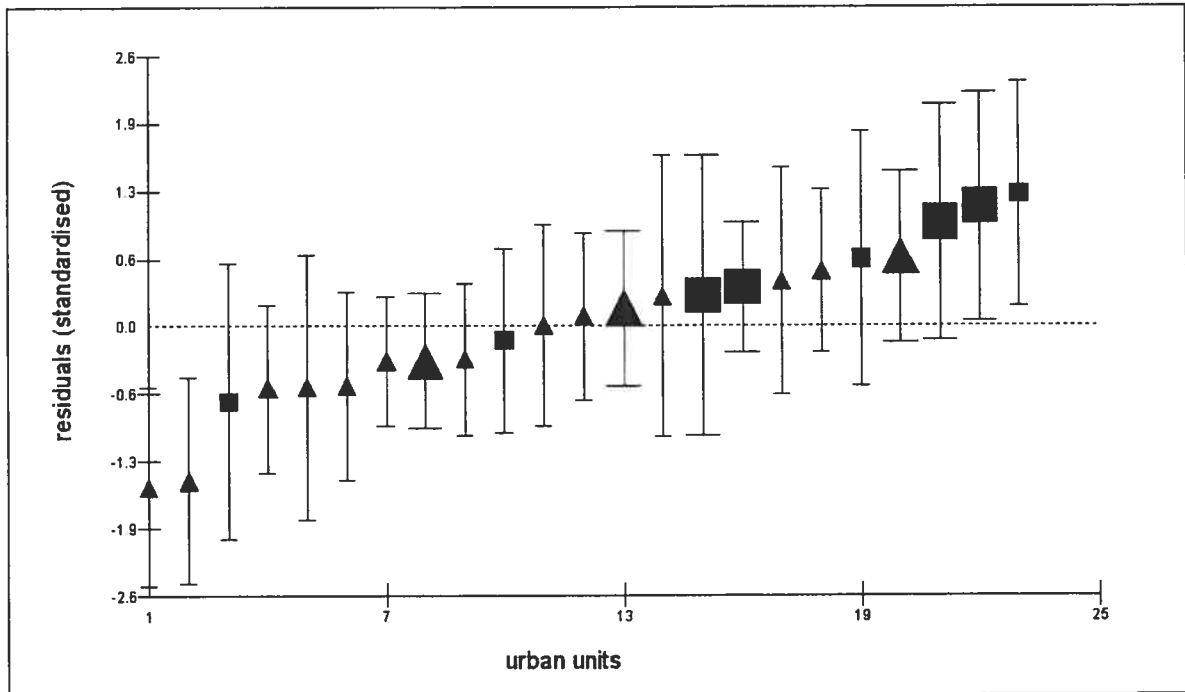
	Poor (N = 43)	Non poor (N = 207)
Public facility too far/too long to be seen in public	20.9 % <sup>1</sup>	9.2% <sup>1</sup>
Poor quality of services in public*	7.0% <sup>1</sup>	43.0% <sup>1</sup>
Medicines not available or not effective in public facility	2.3 %	7.2%
Private doctor more easily available	53.5% <sup>1</sup>	27.1% <sup>1</sup>
Other reasons	16.3%	13.5%

<sup>1</sup>  $\chi^2$  statistics with Yates correction  $p \leq 0.05$

\*include respondents expressing dissatisfaction with previous treatments received, those expressing lack of personal attention and those reporting bad treatments in the public sector

Logistic modelling of choice of a private source of care showed a significant variance between urban units ( $p < 0.05$ ; average of 78% of individuals utilising a private source with plausible value range across units of [28%; 97%]). Dispersion of residuals of utilization (presented in Figure 3) illustrates the variability in utilization of private sources across urban units. High private (enlarged) and low public (squares) bed density units cluster at the right-hand side among units with higher proportion of private utilization.

**Figure 3.** Standardised residuals departure from the mean of private utilization across urban units (ranked).



Legend: High private bed density (large symbols) Low private bed density (small symbols); Low public bed density (squares) High public bed density (triangles).

90% confidence intervals of departure of residuals from the mean shown for each urban context

The final model shows that being very poor and from a casual worker household significantly lowers the probability of using a private source of care (Table 5). Urban units from low public bed density districts and those from high private bed density districts are associated with higher utilization of a private source of care. In the empty model, approximately 28% of the variance was attributable to the urban level. The comparison of the variances between models including individual level predictors and the full model suggests 64% of reduction in variance between urban units. There remains no significant variation between urban units in the final model. Table 6 summarizes the principal results of our analyses of individual- and urban-level factors associated with utilization of health care services and a choice of source of care in urban Kerala.

**Table 5.** Choice of private provider ( $N_j = 23$ ;  $N_i = 365$ ). Logistic regression: parameter estimates; standard errors. (Binomial logit; Weighted; 2PQL)

Fixed effects*	OR	95% C.I.
<b>Individual characteristics</b>		
Age (REF = 2 years and older)		
Below 2 years old	0.30	0.06-1.38
Poverty (REF = Non poor)		
Very poor	0.13	0.03-0.51
Moderately poor	0.57	0.27-1.20
Casual worker (REF = Other)	0.54	0.30-0.97
<b>Urban contexts characteristics</b>		
Low public bed density (REF = high)	4.08	1.05-15.95
High private bed density (REF = Low)	5.83	2.34-14.53
Random effects	Variance	SE
Level 2	0.394	0.274
Intra-class correlation (empty model)	0.28	
Intra-class correlation (final model)	0.11	
* Variables BEDRIDDEN, ONGOING EPISODE, CASTE, REGION, POOR CITY were excluded from the final model.		

**Table 6.** Summary of findings

	Individual level variables	Urban level variables
<b>Access to health care</b>		
<b>Lower</b>	Very poor	Medium towns Low <i>pucca</i> housing
<b>Higher</b>	Bedridden Ongoing illness Below 18 years old	
<b>Choice of private provider</b>		
<b>Lower</b>	Very poor Casual worker	
<b>Higher</b>		Low public bed density High private bed density

## Discussion

### *Poverty and access to outpatient care*

Evidence on barriers to access for the poor is key to the development of equitable health systems and the reduction of social exclusion (Feachem 2000). The study supports previous findings of high utilization, even among the poor, in Kerala (Krishnan 2000; Kunhikannan and Aravindan 2000; World Bank 2001; Mahal and al. 2001). Disaggregating poverty has been suggested to portray the impact of socio-economic vulnerability on access (Vaidyanathan 2001). This is important in Kerala, where consumption expenditure data positions most of the population just above or under the poverty line. We found that, controlling for severity and age, utilization of outpatient care is restricted for the very poor. This corroborates results from studies of health care-seeking which suggested that low economic status households had lower recourse to medical services (Pillai et al. 2003; Gupta and Datta 2003) and higher rates of self-medication (Saradamma 2000).

In our study, the relationship between poverty and perceived severity of illness shows an unclear though interesting pattern. The poor are more likely to report severe diseases but they are also less likely to report benign illnesses. The latter result has probably less to do with differential morbidity across economic groups than with what Amartya Sen calls a “perception bias”, in other words a tendency among the most deprived to report less ill-health and underestimate their health problems (Sen, 2002). Actually, higher levels of perceived health have been reported in Kerala among the poor (Murray and Chen 1993; Sen, 1994) and some of the most deprived tribal populations (Haddad et al. 2005). Some have suggested that increasing costs of care could push the poor not to consider themselves sick (Dilip 2000). This under-reporting tendency, also found in various developing countries, could result in the under-estimation of disparities in access (Castro-Leal et al. 2000). In addition, the reported information, gathered from a single adult per household, could have underestimated the reporting of illness, especially untreated illness, for other members in the household. While utilization data pose challenges, introducing supply-side variables and the controlling of severity has allowed us to provide the best possible assessment of access. Given that very few population-wide surveys collect information on



provider characteristics, our method attempts to disentangle access from utilization data at the population level.

Looking at the distribution of spending among Indian states, previous analyses of NSS data suggested that Kerala is the least unequal jurisdiction, having a fairly even distribution of out-of-pocket spending across income groups (World Bank 2001; Mahal et al. 2001). We did not find a significant difference in levels of utilization between those we called the moderately poor and the non-poor. But the very poor - which accounted for nearly 7% of our sample - showed much lower rates of utilization. In a state like Kerala, with a wide availability of institutions in the public sector, these disparities in access to care can largely be attributed to the relatively high prices of health care goods and services and the economic constraints faced by the very poor. This illustrates the need, even in a so-called egalitarian state like Kerala, for public policies aiming at increasing financial accessibility for the very poor. This goal could be reached by alleviating the financial problems which afflict the poor and the economic burden of their health care costs. One should also consider that in less equity-oriented Indian states or third-world countries, with less-developed public sectors, these inequalities are even more striking.

High levels of reported illness during the last 2-week period have been found in Kerala (27.1% of households in our sample) compared to other Indian states (NSSO 1998; Dilip 2000) or countries (Pannarunothai and Mills 1997). Despite the NSS being a large survey, few cases of reported illness were available for analysis in the urban Kerala sample. Our analyses are sometimes based on low numbers of very poor although their prevalence is in the range found in previous surveys (9.8% in 1993-94 NSS and 6.2% in 1999-2000 in Radakrishna et al. 2004). This explains the size of confidence intervals around odds ratio. While this limits the assessment of the exact magnitude of disparities, statistically significant differences in utilization across economic groups remained. Furthermore, a sensitivity analysis - using 75% of the poverty line as a criteria to define the very poor - showed similar results.

### *Segmented public and private sectors*

Our study corroborates previous findings presented in the introduction about the relatively high rates of utilization in outpatient services in Kerala. It also suggests that the market of outpatient services is segmented. The very poor and casual worker households tend to use public services while the wealthier tend to consult private practitioners. This means a restricted choice of source of care among those who have less, a situation that is worrisome for individuals living in households headed by a casual worker, which represent a growing proportion of poor urban households (Radakrishna et al. 2004). In fact, Kerala is the Indian state with the highest rate of unemployment (Ramachandran 1996) and many of its residents rely on casual work as a source of income.

Over the last two decades, health care costs, especially of private services, have increased significantly in India (Purohit 2001; Dilip 2000; Bhat 1999). This has gradually made several private services unaffordable for the poor and casual workers, restricted their health care opportunities and therefore pushed them to turn to the less attractive but cheaper public sector. Since the poor are known to spend relatively more of their income on health than the rich (Vaidyanathan 2001), choosing a private source of care, or even seeking care at all, can be out of reach for the very poor.

### *Access to quality*

In this study, half of those who utilised private providers justified their choice by mentioning availability-related reasons (22% referred to problems of availability of public care and 32% indicated higher private availability), and quality-related reasons (32% suggested inadequate services in the public system on previous occasions). These findings confirm results from previous studies in India<sup>8</sup> (Kunhikanan and Aravindan 2000; Dilip and Duggal 2004; Yesudian 1994). While reasons for using the private sector were available, no data were available to justify utilization of public services. Further NSS surveys should pay attention to reasons for using public facilities.

The reasons given to justify the utilization of private providers differed according to economic groups. While both poor and non poor expressed problems with the availability

and quality of services in the public sectors, the predominant reasons cited by poor individuals were related to geographical and temporal availability; quality was the main issue for non poor individuals. This suggests that the poorest are constrained by situational factors to utilise the public sector: they become its client by force rather than by choice and ultimately receive services of lesser quality. If we view equity as being closely related to the concept of choice (Gilson 1989; Gilson 1998), a lack thereof generates clear inequities in health opportunities for very poor households. This underlines the necessity for public institutions to respond to the needs of the poor by assuring services with a focus on effective availability and quality (Maiga et al. 2003).

Echoing studies conducted in India and other developing countries, there is evidence to corroborate indications that public hospitals and outpatient units in Kerala provide services of poor quality and that the population have become dissatisfied with their services. Availability of medication and consumables is limited and irregular, maintenance, repair and replacement of building and medical equipment is problematic and there are many concerns about staff motivation, absenteeism and interpersonal behaviours (Narayana 2001; Varatharajan et al. 2002; Kutty 2000; Government of India 2002; World Bank 2001). As a result, barriers to access private health care services also limit opportunities to access quality even though, of course, this does not mean that constant quality standards are the norm in the private sector.

Studies have pointed out many deficiencies in prescribing and treatment practices in the private sector in developing countries (Yesudian 1999; Brugha and Zwi 1998). The perception of higher quality of private services has often been related to better interpersonal skills rather than actual higher technical quality of clinical care. The private sector is very heterogeneous: it includes a wide range of facilities, from sophisticated hospitals serving the high income classes, to small clinics run by poorly qualified practitioners (Yesudian 1994). The poor tend to be more exposed to second-rate care, even in the private sector, where they consult untrained and minimally qualified professionals more often than their better-off counterparts. Indeed, the affluent tend to consume private and public health care in secondary and tertiary level facilities (World Bank 2001; Zwi et al. 2001; Pannarunothai and Mills 1997; Gupta and Datta 2003).

These findings reinforce the call for legislation and guidelines to regulate the activities of the private and public sectors (Bhat 1999; World Bank 2001). Changing the attitude of public providers towards their clients could help to improve perceived quality of care. Furthermore, the poor could see public primary care facilities as an option if problems of availability of medications and quality of doctor-patient relationships were addressed (Saradamma 2000). A strong public sector would play a vital role in curbing some undesirable effects of private care, such as spiralling exploitative costs (Bhat 1999; Government of India 2002).

#### *Supply-side factors related to access*

The study identifies supply-side factors influencing utilization of outpatient care and choice between private and public sources of care. Failure of government facilities to meet patient demand has led to the development of the private sector and to a large increase in private health care expenditure (Kumar 1993). There has been a major increase in the private offering of services in Kerala over the last two decades. This trend may have driven the shift in favour of private providers and may have broadened the gap in access to outpatient care between the very poor and non poor. Increasing availability of quality public health services through targeted financial and resource incentives in certain areas could promote utilization of public services among the poor, thus reducing their barriers to care. Furthermore, insuring the curative capacity of primary care facilities in the public sector would better address the needs of the ageing segment of the population and of those afflicted with persistent communicable diseases, especially when poor (Nath et al. 1998; Saradamma et al. 2000).

We found lower utilization of outpatient care in medium-size towns. In our sample, such towns are home to a significant number of casual workers, whereas no large city showed as high a proportion of casual workers within its population. This, combined with a lower density of public and private beds, suggests there is a true difference with regards to availability of services in medium towns in Kerala (Table 1). A further hypothesis could be that medium towns have not benefited from the development of medical colleges and large private facilities which are mostly found in bigger cities. Neither have mid-sized towns

benefited from the proximity to rural areas – where primary care centres are most numerous in Kerala – that small towns enjoy. Further studies should look into this to better explain this phenomenon.

We used the most recently available population survey on health care in India. While it is not yet possible to assess any trends in the associations found with barriers to utilization of outpatient care, some evidence suggests that the situation could be worsening. Between 1986 and 1996, there has been a 4% increase in the number of untreated ailing persons among the lower expenditure group, and the utilization of public sector outpatient services has been declining overall (NSSO 1998; Purohit 2001). This trend has been attributed to cuts in public investments (Government of India 2002; Dilip and Duggal 2004).

## **Conclusion**

Kerala is a unique demographic, social and political context. A model of development of good health at low cost, it is now facing the challenges of an aging population, the emergence of chronic diseases and the demands of a health-conscious population. Our attempt to understand the factors associated with the utilization of health care services and the choices of source of care sheds light on disparities in access in urban Kerala. Ensuring access to care for the poorest and providing them with opportunities to access quality care poses challenges: it demands a reassessment of public primary care infrastructure in urban areas and the implementation of mechanisms to reduce the economic burden linked with utilization of health services, especially in the private sector. Important planning and allocation decisions are awaiting Kerala and other Indian states along with developing countries to meet the health needs of the urban poor. Kerala can again be a source of knowledge for other states and countries entering similar phases of development. This study points to the need for continuing improvements and development of public health systems in urban areas of developing countries, especially in medium towns, as a means to promote equity.

## Endnotes

<sup>1</sup> This poverty line represents an indexation for 1995-1996 of the most recent per capita poverty line (1993-1994) suggested by the India Planning Commission.

<sup>2</sup> This type of measure corrects for the overestimation of poverty introduced by per capita measures of poverty. In a context like that of Kerala, where the distribution of income across households shows lesser variability and where a concentration of households spread around the poverty line, the use of adjusted monthly per capita poverty consumption expenditure can identify the poorest households. Sensitivity analyses have confirmed that the *very poor* concentrate well under the per capita poverty line. The equivalence scale used attributed a value of 1 for the first adult, 0.7 for each subsequent adult and 0.5 for every member below 18 years of age (OECD 1982).

<sup>3</sup> Multilevel modelling allows for the simultaneous estimation of individual and contextual effects and takes into account the extent to which individual responses are correlated through membership in clusters of higher levels, in our case urban units. It provides an appropriate partitioning of variance between individual and urban levels to generate unbiased estimates (Snijders and Bosker 1999).

<sup>4</sup> All analyses were performed using restricted iterative generalized least-square (RIGLS) with the second order and penalized quasi-likelihood (PQL) approximation method. Variables were kept in the models when considered the main outcomes of interest, when statistically significant (95% C.I. excluding the null value) or, if not significant, when they showed an impact on other significant variables.

<sup>5</sup> Illness episode refers to the complete duration of the illness; benign illness refers to an illness for which no confinement to bed was ever reported during the episode while a severe illness involves confinement to bed at some point during the episode.

<sup>6</sup> The first models included a random intercept and level 2 (urban) variance components. This so-called “empty” model did not include any explanatory variables and enabled us to determine the extent to which the nesting of individuals within urban contexts explained a significant part of the variance in the outcome of interest. The second models tested individual-level variables, while the final models tested the addition of urban-level variables. The second and third models were compared with the “empty” model using the deviance chi-square test statistic.

<sup>7</sup> *Pucca* houses or permanent houses are those whose walls and roof are both made of permanent materials. The walls are either built with burnt bricks, metal sheets, stone or cement concrete. Roofing materials include tiles, slate, shingle, corrugated iron, zinc or other metal sheets, asbestos cement sheets, bricks, lime and stone, stone and RBC/RCC or concrete. *Kutcha* or temporary houses are dwellings whose walls and roofs are made of materials which need frequent replacements. Walls may be made of grass, leaves, reeds, bamboo, mud, unburnt brick or wood. The roof may be made from grass, leaves, bamboo, thatch, unburnt bricks or wood.

<sup>8</sup> Those who preferred private care perceived that public facilities are in inconvenient locations (Nandraj et al. cited in Dilip and Duggal 2004), that private services are more adequate (23% of respondents), in closer proximity (15%) and that private doctors behave more appropriately (13%) (Kunhikanan and Aravindan 2000). The reasons for not using government institutions in this study were: no treatment available (10%); no medicines (14%); no doctor available (10%); solicitation of bribery (5%); or premises not clean (3%). A study of poor urban dwellers in Mumbai suggested long waiting hours, long distances and too brief contacts with the doctor as reasons for not using governmental services (Yesudian 1994).

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## Appendix 1. Urban-level variables under study.

Name	Operational definition	Categories	$N_j$	$n_i$	$\%_i$
<b>Urban size</b>	Size of the urban units	Small towns (below 50,000 inhabitants)	11	254	61.6
		Medium town (50,000-199,999 inhabitants)	7	55	13.3
		Large town (200,000 inhabitants or more)	5	104	25.2
<b>Public bed density</b>	Density of public beds (per thousand population) in the district	Low (below mean of districts)	9	56	13.7
		High (above mean of districts)	14	356	86.3
<b>Private bed density</b>	Density of private beds (per thousand population) in the district	Low (below mean of districts)	14	173	42.0
		High (above mean of districts)	9	239	58.0
<b>Poor households</b>	Proportion of households below the poverty line in the NSS 52 <sup>nd</sup> round urban units	Low (below mean of districts)	16	253	61.3
		High (above mean of districts)	7	159	38.7
<b>Casual worker households</b>	Proportion of households with casual work as main source of income in the NSS 52 <sup>nd</sup> round urban units.	Low (below mean of districts)	14	344	83.6
		High (above mean of districts)	9	68	16.4
<b>Pucca housing</b>	Proportion of households living in a house made of permanent material ( <i>pucca</i> ) in the NSS urban units	Low (below mean of districts)	4	41	10.0
		High (above mean of districts)	19	371	90.0

$N_j$  = number of urban-level units

$n_i$  = number of individual-level units

$\%_i$  = proportion of the individual-level sample

## Appendix 2. Individual-level variables under study.

Name	Operational definition	Categories	n <sub>i</sub>	%
<b>Illness episode</b>	Reporting an illness during the previous 15 days			
<b>Utilization of outpatient care</b>	Having used any types of medical care as an outpatient (not hospitalised)	Yes No	343 69	83.2 16.8
<b>Utilization of private source of care</b>	Having used a private source of care (not from governmental institutions)	Private source of care Public source of care	265 78	77.3 22.7
<b>Age</b>	Age at time of survey	Below 2 years old 2-17 years old 18-49 years old 50 years and older	33 162 159 58	8.0 39.3 38.5 14.2
<b>Sex</b>	Sex	Female Male	203 209	49.3 50.7
<b>Caste</b>	Coming from a scheduled caste or scheduled tribe household	Scheduled caste or tribe Other castes	31 381	7.5 92.5
<b>Poverty</b>	Household with monthly per capita (non adjusted and adjusted) consumption expenditure below the poverty line	Very poor Moderately poor Non-poor (above poverty line)	28 62 322	6.9 15.1 78.0
<b>Employment</b>	Type of employment reported as main source of income in the household	Casual work Non casual work	138 273	33.5 66.5
<b>Confinement to bed</b>	Confinement to bed for at least one day during the illness episode	Bedridden No confinement to bed	117 296	28.3 71.7
<b>Previous hospitalisation</b>	Having had an hospitalisation during the last 365 days	Previous hospitalisation No previous hospitalisation	41 371	9.9 90.1
<b>Illness status</b>	Status of illness at time of survey	Ongoing illness Illness resolved	150 262	36.4 63.6
<b>Chronic disease</b>	Diseases lasting for more than 30 days	Acute illness Chronic illness	395 18	95.7 4.3

# Insular pathways to health care in the city: a multilevel analysis of access to hospital care in urban Kerala

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## Insular pathways to health care in the city: a multilevel analysis of access to hospital care in urban Kerala.

Jean-Frédéric Levesque, Slim Haddad, D Narayana and Pierre Fournier

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### ABSTRACT

**OBJECTIVE** To identify individual and urban unit characteristics associated with access to inpatient care in public and private sectors in urban Kerala and discuss policy implications of inequalities in access.

**METHODS** NSSO survey (1995-1996) for urban Kerala was analysed with regard to source and trajectories of hospitalisation. Multinomial multilevel regression models were built for 695 cases nested in 24 urban units.

**FINDINGS** Private sector accounts for 62% of hospitalisations. Only 31% of hospitalisations are in free wards and 20% of public hospitalisations involve payment. Hospitalisation pathways suggest a segmentation of public and private health markets. Members of poor and casual worker households have lower propensity of hospitalisation in paying public wards or private hospitals. Important variations between cities are found, with higher odds of private hospitalisation in towns from low total bed density and high private-public bed ratio districts. Cities from districts with better economic indicators and dominance of private services have higher proportion of private hospitalisations.

**CONCLUSION** The private sector is the predominant source of inpatient care in urban Kerala. The public sector has an important role in providing access to care for the poor. Investing in the quality of public services is essential to ensure equity in access.

**Keywords:** access to health care; poverty; developing countries; India; urban health services

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### Introduction

Urban dwellers in developing countries generally have better access to health care services than rural residents. Yet there are disparities –albeit hidden by urban averages and rural/urban comparisons– showing that health facilities often benefit an affluent minority (Harpham & Tanner, 1995; Cairncross et al., 1990; World Health Organization, 1993; Rossi-Espagnet et al. 1991). In developing countries, access to care is related to economic status, a situation which impacts negatively upon the poor (Pannarunothai & Mills, 1997; Pillai et al., 2003; McDade & Adair, 2001).

Despite slow economic growth, the South Indian state of Kerala has made great strides in the field of public health: among Keralites, health awareness is strong and medical services consumption is high (Pillai et al., 2003; Kumar, 1993; National Sample Survey Organization, 1998). In the wake of its success in reducing mortality, Kerala faces the

double burden of *diseases of poverty* and *diseases of affluence*, which presumably stem from the ageing of the population (Michael & Singh, 2003; Kutty et al., 2000; Zacharia et al., 2003; Joseph et al., 2000) and the persistence of widespread poverty (Dilip, 2002). Concerns over the public system's capacity to address the needs of an ageing population and to meet an increasing demand for health care have been raised (Sureshkumar & Rajagopal, 1996; Bollini et al., 2004; Purohit, 2001).

Among major Indian states, Kerala shows the highest density of medical facilities in both the public and private sectors. It has over 300 hospital beds per 100 000 population (Bhat, 1999; Government of India, 2003). Its public health sector comprises Medical Colleges, District and Local hospitals and Primary Health Centres (PHCs) and sub-centres. Although it spends more on health care per capita than other states, Kerala's contribution has diminished. Between 1991 and 2001, the share of overall government health expenditures dropped from 25% to 17%. Such cuts caused available funds to stagnate at a time when, due to increasingly expensive medical technology, the cost of hospital care outpaced the index of general commodities (Varatharajan et al., 2002).

The private sector expanded so much between 1986 and 1995 (40% increase in hospital beds in the private sector vs. 5.5% in the public sector) that its facilities currently outnumber those of the public sector. Furthermore, 60% of hospitalisations are private (Krishnan, 2000; Kutty, 2000). Highly heterogeneous, the private sector ranges from small clinics to large corporate hospitals. It also presents marked differences in provider qualifications (World Bank, 2001) with the coexistence of not-for-profit (e.g. voluntary health programmes, charitable institutions, missions, churches and trusts) and for-profit institutions (e.g. general practitioners, private hospitals and dispensaries, and registered medical practitioners), as well as a large private informal sector (e.g. practitioners without formal training, faith healers, herbalists, priests) (Bhat, 1993). Some studies suggest that the poor utilize both the public and private sectors for outpatient and hospital care (Krishnan, 2000; Devadasan et al., 2004).

Research on health care has focused on rural rather than urban areas of Kerala; hence, inequalities in access to hospital care have not been documented across a wide range of urban areas (Vaidyanathan, 2001). What pathways are taken to access hospital care in

cities? With a broad range of public and private institutions, are the same options available to all, regardless of economic status? Does the city of residence influence access to care? This paper aims to shed some light on the pathways that lead to and determine the source of hospital care in urban Kerala.

## **Methods**

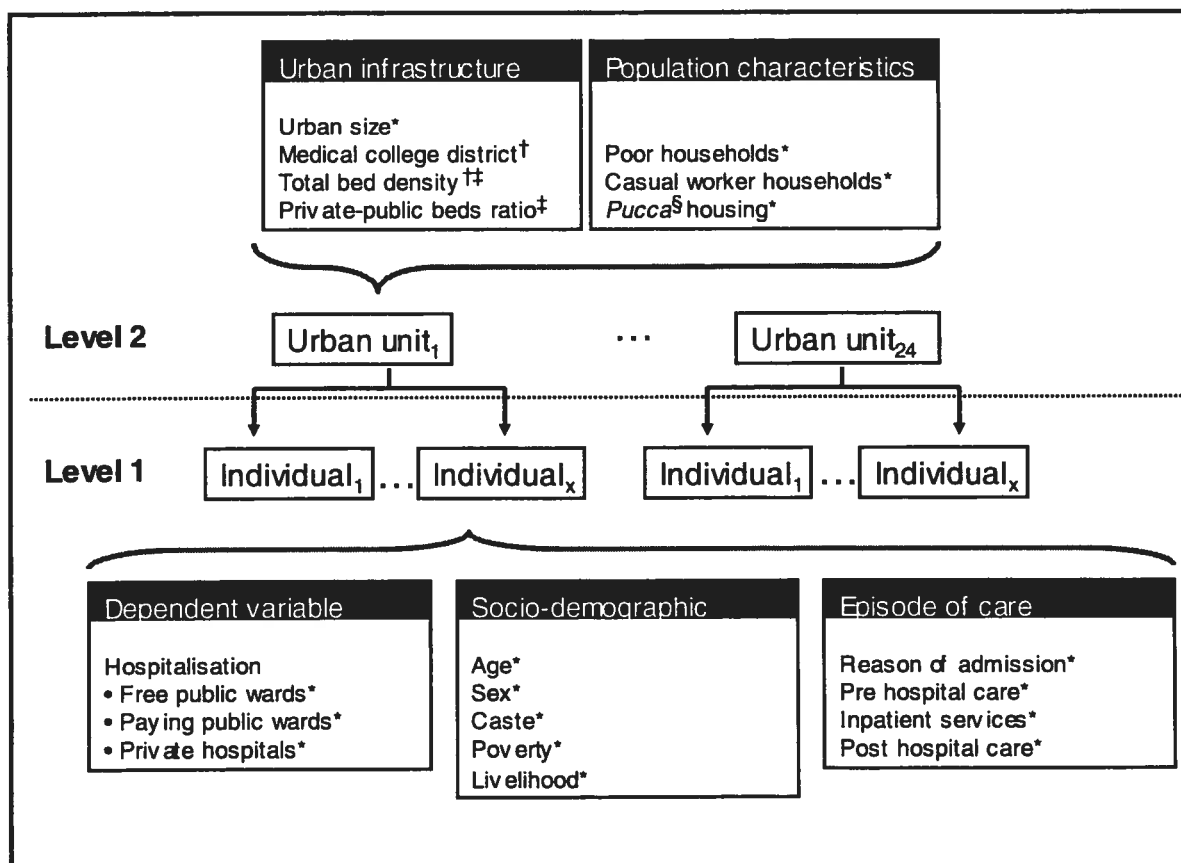
We analysed the urban sample for Kerala from the 52<sup>nd</sup> round of the National Sample Survey Organization's health survey database (National Sample Survey Organization, 1996). The two-stage cluster sampling randomly selected census urban blocks in the first stage. Subsequently, 10 households were randomly chosen in each block with oversampling of two households with young infants and those reporting at least one hospitalisation during the previous year (2 households). A total of 10,314 individuals from 2,078 households were surveyed. The NSSO questionnaire sought information on characteristics of individuals (e.g. sex, reporting of illness) and households (e.g. caste, livelihood), and on episodes of inpatient care. The data were elicited by interviewing the household head or another adult. Definitions and descriptive statistics of the study's variables are shown in appendices 1 and 2.

We classified each case of hospitalisation based on hospital (public or private) and ward type (free or paying). Poor households are those with monthly per capita consumption expenditures (MPCE) below the per capita poverty line of 310 Indian rupees (INR) (approximately 7 US dollars) established by the India Planning Commission for 1993-1994, annualised for 1995-1996. Respondents were grouped in 24 urban units according to their place of residence. The medium and large cities were identified with the information available and smaller urban agglomerations (< 50,000 inhabitants) were grouped in 12 district-like clusters of small towns. Four variables relating to the level of infrastructure and three variables relating to population characteristics were created.

Factors associated with type of hospitalisation were assessed using multilevel modelling. This provides for the estimation of individual and contextual influences, and allows for partitioning of the variance between individual and higher levels in order to generate unbiased estimates of associations (Snijders & Bosker, 1999). Weighted analyses were

used to correct for the stratified sampling in the NSSO survey<sup>11</sup>. Regression models were performed with MLwiN software (Multilevel models project, 2003). Figure 1 shows the source of data and multilevel structure.

**Figure 1:** Source of data and variables



\* NSSO, Schedule 25.0, 52<sup>nd</sup> round, 1995-1996; † Kerala State Planning Board, Economic Review, 1996.

‡ Survey of Private Medical Institutions in Kerala, 1995.

§ Pucca houses or permanent houses are those whose walls and roof are both made of permanent materials.

## Findings

### *Hospitalisation pathways in urban Kerala*

During the 365-day period prior to survey, 6.2% of individuals were hospitalised in urban Kerala, 62% in private hospitals and 38% in public institutions; 32% were admitted to free wards (units or floors) and 68% had to pay for their admission. One out of every five patients hospitalised in the public sector entered a paying ward. Table 1 shows mean

<sup>11</sup> This enables us, in our analysis, to provide representative estimates in order to correct for the sampling design and over sampling of certain households through the stratified sampling.

durations of stay and the percentage of patients receiving diagnostic tests across the study variables. Mean durations of stay were longer for the aged, the chronically ill, the members of scheduled castes or tribes (SC/ST), the wealthy, the public sector patients, and the patients reporting an outpatient consultation prior to their hospitalisation. The rich spent more time in public hospitals, their median duration of stay totalling 13 days compared with 5 in private institutions. The poor showed median durations of stay of respectively 7 and 5 days in public and private facilities.

**Table 1: Associations of study variables with duration of stay and use of diagnostic tests**

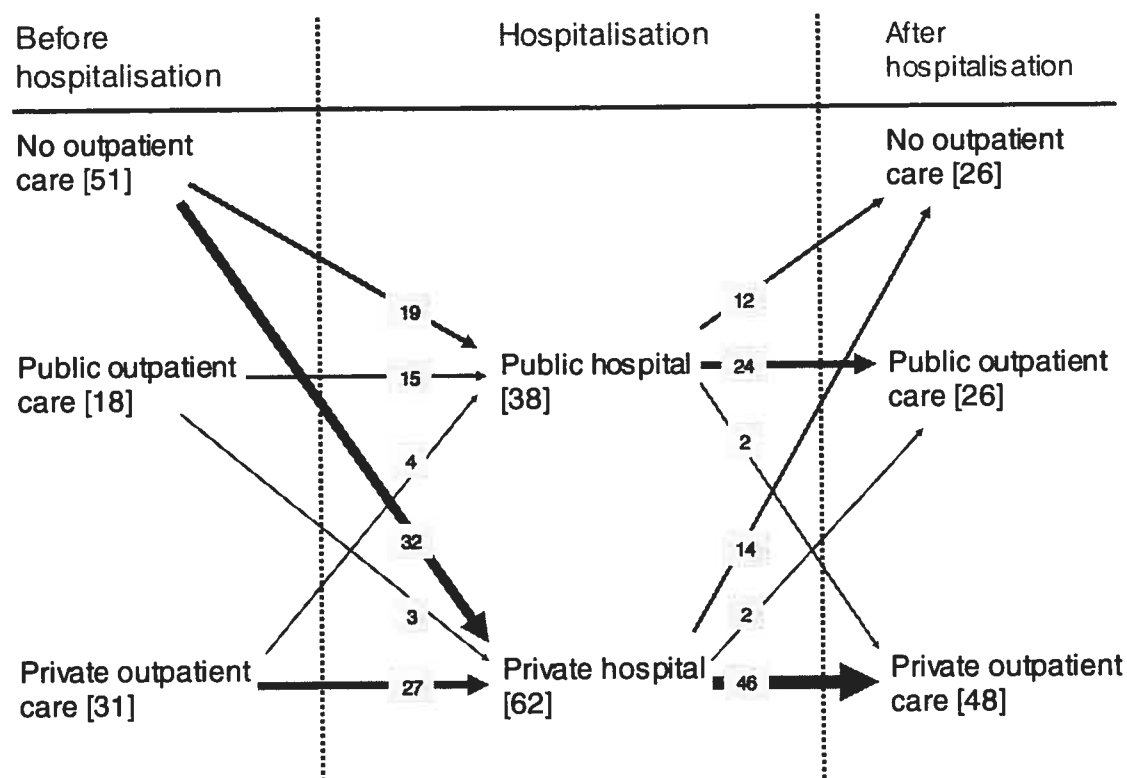
		Mean duration of hospitalisation (days)	Having had diagnostic tests (%)
Sex	Female	10.4	52.2 <sup>†</sup>
	Male	10.5	50.0 <sup>†</sup>
Age	Below 2 years	5.5*	20.6 <sup>†</sup>
	2-17 years	7.0*	34.5 <sup>†</sup>
	18-49 years	9.5*	48.7 <sup>†</sup>
	50 years and older	13.5*	51.8 <sup>†</sup>
Type of illness	Acute illness	7.8* <sup>1</sup>	38.4 <sup>†</sup>
	Chronic illness	15.0* <sup>1</sup>	59.5 <sup>†</sup>
Disease	Infectious	9.5*	20.9 <sup>†</sup>
	Cardiopulmonary	10.5*	64.0 <sup>†</sup>
	Chronic non-communicable	14.1*	57.4 <sup>†</sup>
	Injury	13.1*	71.7 <sup>†</sup>
	Others	8.3*	44.6 <sup>†</sup>
Castes	Scheduled castes or tribe	14.5*	52.7
	Other	10.0*	45.4
Livelihood	Self-employed	9.6	48.4 <sup>†</sup>
	Regular wage/salaried	10.7	49.3 <sup>†</sup>
	Casual worker	11.2	41.9 <sup>†</sup>
Economic status	Very poor	6.4*	24.2 <sup>†</sup>
	Moderately poor	7.7*	38.5 <sup>†</sup>
	> PL < 3PL	11.6*	46.7 <sup>†</sup>
	Above 3PL	10.6*	62.5 <sup>†</sup>
Hospital ward	Free public	13.7*	44.2
	Paying public	14.3*	44.9
	Private	8.4*	47.3
Pre-hospital care	No	9.3*	39.3 <sup>†</sup>
	Yes	11.6*	53.5 <sup>†</sup>
Post-hospital care	No	9.4	34.1 <sup>†</sup>
	Yes	10.8	50.8 <sup>†</sup>

\* ANOVA F test  $p \leq 0.05$  <sup>†</sup> Pearson's  $\chi^2$  statistics  $p \leq 0.05$ ; PL = Poverty line

Virtually all inpatients (99.5%) received some medication. The proportion of those having undergone diagnostic tests while hospitalised was higher among the male patients, the aged, the chronically ill, and among individuals having consulted as outpatients prior to and after hospitalisation; it was lower among casual workers and the poor. The median total health care expenditure for public sector hospitalisations reached 565 INR, compared with 1000 INR for private hospitalisations. Health care expenditures of the poor in the private sector (600 INR) increased twofold compared with the public sector (279 INR).

Figure 2 describes the health care trajectories of a virtual cohort of 100 hospitalised cases, applying the rates found in our study. Half the patients sought outpatient care prior to hospitalisation; the rest were admitted directly. An equal proportion of patients (roughly 38%) sought admission to a public hospital, whether or not they had used outpatient care before hospitalisation. There is very little *crossing-over* between the public and private sectors for both outpatient and inpatient care. Only 11% of private-hospital patients report having consulted in a public facility prior to hospitalisation; in the same circumstances, 23% of public-hospital patients report consultation with a private provider (Rate ratio: 2.06 95% C.I. [1.26; 3.37]). The proportion of patients seeking outpatient care after being discharged from hospital is lower in the public than in the private sector (68% compared with 77%; RR of 0.89 95% C.I. [0.77; 0.94]). Public- and private-sector patients receiving outpatient care following their hospitalisation account for 9% and 5% of cases respectively (RR of 1.90 95% C.I. [0.95; 3.79]). Thus, there is segmentation between the public and private sectors based on outpatient care prior to hospitalisation, hospitalisation period, and post-discharge outpatient care.

Public-sector hospital patients are as likely as their private-sector counterparts to experience recurring hospitalisations (11% compared with 14% respectively (RR 0.75 [0.47; 1.18]), and very few individuals shift between sectors (data not shown). Yet, private inpatients are less likely than public-hospital patients to remain in the same sector when re-hospitalized (RR 0.81 [0.71; 0.92]).

**Figure 2:** Health care trajectories of a virtual cohort of 100 hospitalised patients

### *Factors related to sector of hospitalisation*

Table 2 presents bi-variate associations of variables with hospitalisation in free public, paying public or private hospitals. No significant gender differences were found. However age, type of illness, caste, livelihood and economic status were associated with the type of hospital attended. At the urban-unit level, urban size, infrastructure variables and proportion of *pucca* housing in the units were associated with varying distributions of hospitalisation across sectors.

Graph 1 shows the proportion of free public, paying public and private hospitalisations across urban units. The heterogeneity between urban units with regards to the share of hospitalisations by sources is clear. The graph suggests that urban units endowed with a medical college (cf. table 4) –except Kochi/Ernakulam– cluster at the top end with more public hospitalisations, whereas small towns cluster at the bottom with more private hospitalisations.

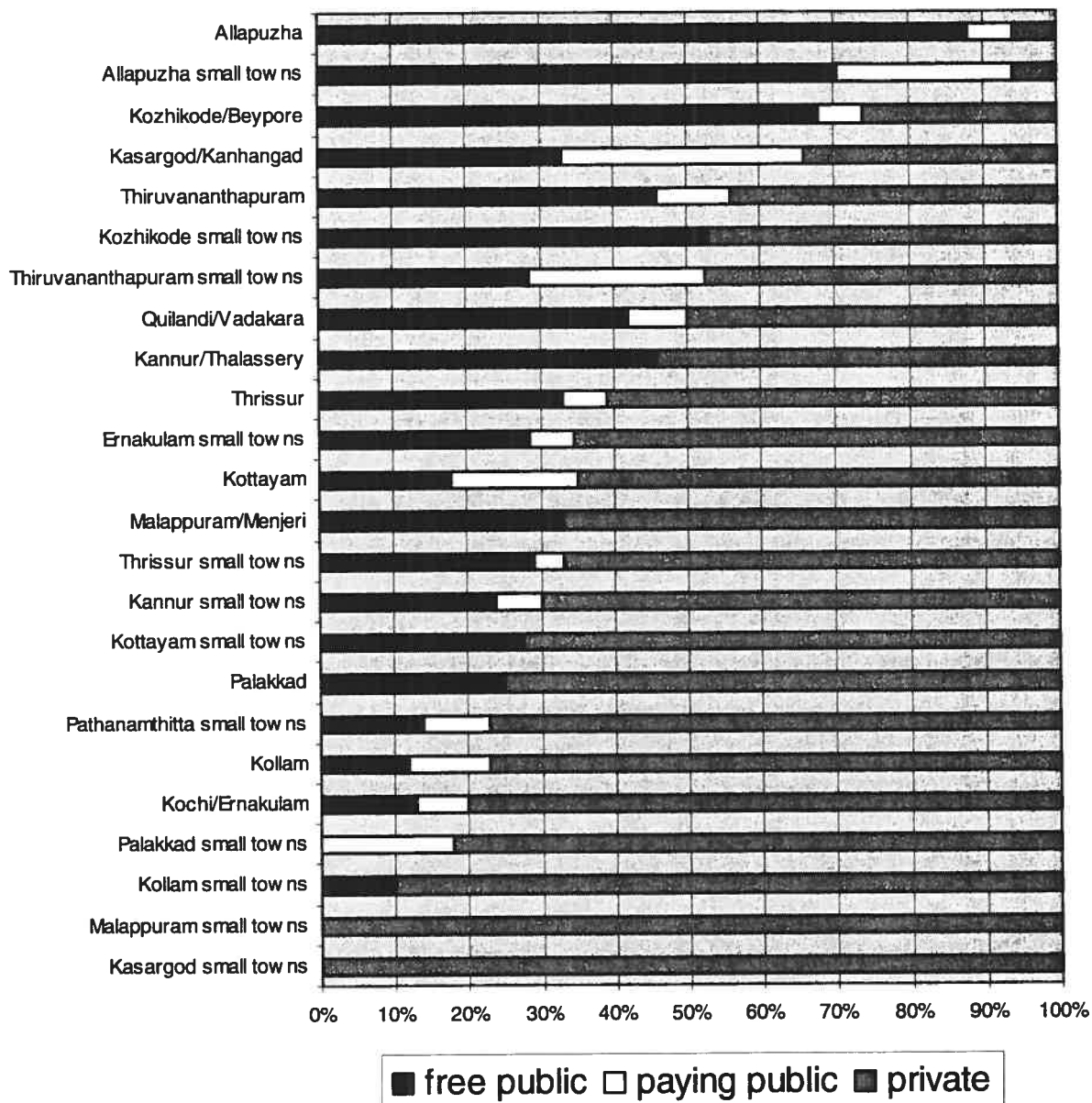
Table 2: Associations of study variables with sector of hospitalisation

		Free public hospitalisation (%)	Paying public hospitalisation (%)	Private hospitalisation (%)
<b>Individual level</b>				
Sex	Female	29.3	7.3	63.4
	Male	32.8	6.8	60.4
Age	Below 2 years	28.6*	8.6*	62.9*
	2-17 years	27.3*	1.8*	70.9*
	18-49 years	28.1*	10.4*	61.5*
	50 years and older	36.0*	5.5*	58.5*
Type of illness	Acute illness	28.0*	5.7*	66.2*
	Chronic illness	36.3*	9.3*	54.4*
Disease	Infectious	33.0*	4.7*	62.3*
	Cardiopulmonary	25.6*	8.5*	65.9*
	Chronic non-communicable	38.0*	10.2*	51.9*
	Injury	33.3*	13.0*	53.7*
	Others	28.5*	5.1*	66.5*
Castes	Scheduled castes or tribe	52.7*	1.8*	45.5*
	Other	28.9*	7.5*	63.5*
Livelihood	Self-employed	24.0*	5.5*	70.5*
	Regular wage/salaried	19.6*	12.4*	68.0*
	Casual worker	44.7*	5.7*	49.6*
Economic status	Very poor	59.4*	0.0*	40.6*
	Moderately poor	36.2*	6.2*	57.7*
	> PL < 3PL	32.6*	6.7*	60.8*
	Above 3PL	7.4*	12.6*	80.0*
<b>Urban units level</b>				
Urban size	Small towns	29.5*	6.2*	64.2*
	Medium towns	45.2*	9.6*	45.2*
	Large towns	29.2*	7.6*	63.1*
Infrastructure	Non medical college district	13.1*	10.7*	76.2*
	Medical college district	33.5*	6.7*	59.8*
	Low total bed density	47.2*	8.8*	44.0*
	High total bed density	22.1*	6.1*	71.8*
	Low private-public ratio	42.2*	5.4*	52.4*
	High private-public ratio	28.1*	7.5*	64.4*
Population	High Below PL population	35.2	9.0	55.7
	Low Below PL population	30.2	6.6	63.1
	High casual worker population	36.0	7.9	56.2
	Low casual worker population	30.4	6.9	62.7
	Low pucca housing	29.9*	13.1*	57.0*
	High pucca housing	31.3*	6.0*	62.8*

\*Pearson's  $\chi^2$  statistics  $p \leq 0.05$ ; PL = Poverty line



**Graph 1: Proportion of free public, paying public and private hospitalisations across urban areas**



Poverty and casual work are associated with hospitalisation in free public hospital wards in the multinomial logistic regression model (cf. table 3), controlling for age and other covariates. Wealthier individuals ( $> 3PL$ ) are more likely to be hospitalised in private hospitals or paying public wards. Residents of urban units located in low-bed density districts are more likely to be hospitalised in free public wards; those from high private-public bed ratio districts have a higher propensity to seek care from private hospitals. Variables related to the type of illness, caste, urban size and proportion of *pucca* housing have been dropped from the final model.

Table 3: Multinomial logistic regression of hospitalisation sources

(REF = Free public; n =216)		Paying public (n = 49)		Private (n = 430)	
Fixed effects		OR	[95% C.I.]	OR	[95% C.I.]
Individual characteristics (Ni = 695)					
Age	(REF = 18-49 years)				
	Below 18 years	0.37	[0.13-1.04]	1.19	[0.71-2.03]
	50 years and older	0.37	[0.17-0.80]	0.84	[0.53-1.32]
Livelihood	(REF = Regular wage/salaried)				
	Casual worker	0.27	[0.10-0.70]	0.34	[0.18-0.63]
	Self-employed	0.64	[0.25-1.62]	0.81	[0.43-1.54]
Economic status	(REF = > 1PL < 3PL)				
	Poor (Below PL)	0.32	[0.11-0.90]	0.48	[0.31-0.75]
	Above 3PL	7.94	[2.44-25.8]	7.05	[2.73-18.2]
Contextual characteristics (Nj = 23)					
Bed density in the district	(REF = High)				
	Low total bed density district	0.76	[0.20-2.90]	6.04	[2.71-13.5]
Private-public bed density ratio	(REF = Low)				
	High private-public ratio	0.37	[0.17-0.80]	0.84	[0.53-1.32]
<b>Random effects</b>		<b>Variance SE</b>		<b>Variance SE</b>	
Level 2		0.590	0.431	0.362	0.222
Covariance		0.286	0.256		

\*Variables TYPE OF ILLNESS, DISEASE, CASTES, URBAN SIZE, MEDICAL COLLEGE, and all urban level household characteristics variables were excluded from the final model.

To better understand the results of the analyses, we examined the relationship between the characteristics of urban units and their residents and the hospitalisation sector. Table 4 provides data regarding each urban unit's households in terms of size, economic status (proportion of poor, casual worker households) and construction type (*pucca* housing). It also indicates the presence (or absence) of a medical college and the density of public and private beds at the district level. Two criteria guided our classification of urban units: socioeconomic level and dominance of health services supply. Based on the mean per capita consumption expenditure and the proportion of poor and of casual workers, urban units were categorised as unfavourable or favourable. Urban units with private to public bed ratios below 1 were considered public dominant, those above 2 were categorized as strongly private dominant and the others were labelled slightly private dominant (see table 5).

**Table 4:** Description of urban units

Urban units*	Urban size	Proportion of		Proportion of casual workers	Proportion of pucca housing		Presence of a medical college		Bed density <sup>†</sup>	
		poor	rich		pucca	chawls	medical	college	public	private
Kasaragod district	Small	17 [+]	83 [+]	83	no	79 [low]	122 [low]			
Kasaragod/ Kanganhangad	Medium	63 [+]	68 [+]	88	no	79 [low]	122 [low]			
Kannur district	Small	23 [+]	45	74	no	104	182 [low]			
Kannur/Thalassery	Medium	13 [+]	29	85	yes	104	182 [low]			
Kozhikode district	Small	16 [+]	55 [+]	83	no	177	155 [low]			
Quilandi/Vadakara	Medium	13 [+]	64 [+]	70	no	177	155 [low]			
Kozhikode/Beyppore	Large	9	42	89	yes	177	155 [low]			
Malappuram district	Small	5	60 [+]	81	no	77 [low]	128 [low]			
Malappuram/Menjeri	Medium	0	50 [+]	83	no	77 [low]	128 [low]			
Thrissur district	Small	7	43	86	no	159	325			
Thrissur	Large	10	18	87	yes	159	325			
Palakkad district	Small	8	44	48 [-]	no	94 [low]	94 [low]			
Palakkad	Medium	0	55 [+]	97	no	94 [low]	94 [low]			
Ernakulam district	Small	11	35	89	no	150	412			
Kochi/Ernakulam	Large	8	37	95	yes	150	412			
Kottayam district	Small	33 [+]	36	84	no	202	432			
Kottayam	Medium	5	41	95	yes	202	432			
Allapuzha district	Small	31 [+]	49	96	no	208	192 [low]			
Allapuzha	Medium	10	50	74	yes	208	192 [low]			
Pathanamthitta district	Small	8	37	90	no	96 [low]	378			
Kollam district	Small	5	55 [+]	86	no	97 [low]	312			
Kollam	Large	0	33	39 [-]	no	97 [low]	312			
Thiruvananthapuram district	Small	11	54 [+]	62 [-]	no	250	177 [low]			
Thiruvananthapuram	Large	10	29	65 [-]	yes	250	177 [low]			

\*The term district describes a grouping of small towns in one district

<sup>†</sup>Number of beds per *lakh* population (100 000 persons) at the district level

[+] denotes above the districts mean; [-] denotes below the districts mean

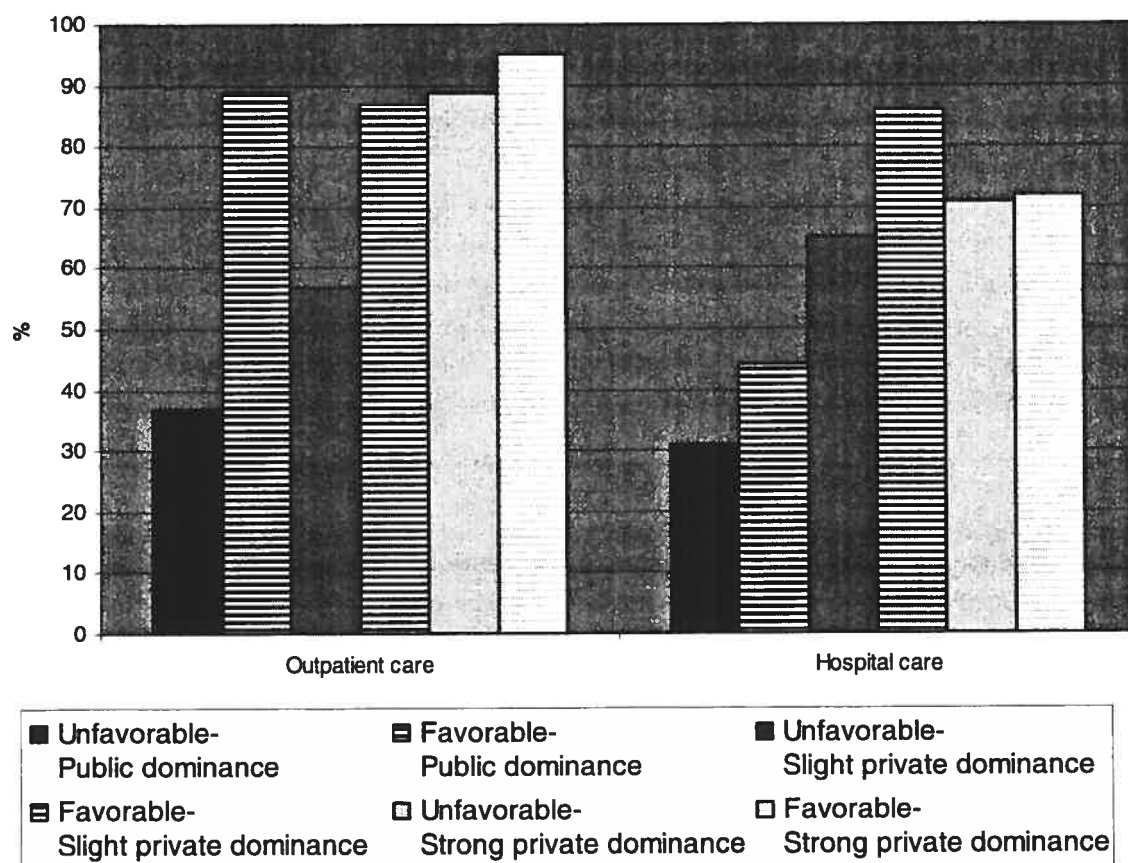
Table 5: Classification of urban areas across economic and health care supply dimensions

	<b>Unfavorable economic contexts†</b>	<b>Favorable economic contexts†</b>
<b>Public dominance*</b>	Kozhikode district	Thiruvananthapuram
	Allapuzha district Thiruvananthapuram district Kozhikode Quilandi Allapuzha	
<b>Slight private dominance*</b>	Kasaragod district Kannur district Kannur Kasaragod/Kanhangad Malappuram	Malappuram district\ Palakkad district Palakkad
<b>Strong private dominance*</b>	Thrissur district Kottayam district	Ernakulam district Pathanamthitta district Kollam district Thrissur Ernakulam Kottayam Kollam

\*Public dominance: Private-public bed ratio  $<1$ ; Slight private dominance: Private-public bed ratio  $\geq 1$  and  $\leq 2$ ; Strong private dominance: Private-public bed ratio  $>2$

†According to the clustering of mean per capita consumption expenditure level, proportion of casual worker population and proportion of persons below poverty line in the NSSO database.

Plotting these six urban-related categories, we found a gradient of increasing private utilisation for both outpatient and hospital care (graph 2). Favourable contexts and those with a dominance of private beds have higher levels of private utilisation. The situation is slightly different between outpatient care and hospitalisation since all favourable contexts present high levels of private outpatient care utilisation, regardless of the dominance in beds. In contrast, favourable urban contexts show an increasing proportion of private hospitalisations as one moves along the dominance categories.

**Graph 2: Proportion of private utilisation across urban contexts**

## Discussion

### *Hospitals as points of entry*

Hospitals in both sectors are used as an entry point to the health system in urban Kerala. Indeed, half of the inpatients had not received outpatient care before their hospitalisation. Furthermore, public and private hospitals respectively provide 20% and 40% of outpatient care delivered in urban Kerala, compared with 1% for PHCs and 25% for private clinics (National Sample Survey Organization, 1998). Hospitals have become entry points because Kerala's health system includes a huge dynamic private sector –accounting for the vast majority of the State's doctors (86%), hospitals (82%) and beds (58%) (Varatharajan et al. 2002; Kutty, 2000) – where outpatient and inpatient units are often integrated. Most private clinics have small adjacent inpatient wards. The majority of private hospitals are under-10 bed facilities, usually owned by a practicing doctor.

The reliance on hospitals as entry points reveals two parallel problems: the relative lack of primary care facilities in the public sector and the underutilisation of those already in existence (Varatharajan et al. 2002). Ambulatory care units of public hospitals provide first-contact care in Kerala and an undue reliance on hospitals for treatment of minor ailments has been reported (World Bank, 2001; Mahal et al., 2001; Saradamma et al., 2000; Dilip & Duggal, 2004). This questions the role of public primary care facilities with regards to curative care and points to problems of availability and quality of services in PHCs (Varatharajan et al. 2002; Gumber, 2001; Deogaonkar, 2004).

#### *Private sector as main source of hospital care*

Our study reports the private sector as the principal source of care in urban Kerala. The findings echo other research revealing high levels of utilisation of the private sector for both outpatient care and hospitalisation (Government of India, 2003; World bank, 2001; Sekhri & Savedoff, 2005). The public sector has not kept up with the growing demand for health care in recent years (Kumar, 1993; Nabae, 2003). It currently accounts for 17% of institutions, 40% of beds and 14% of doctors (Varatharajan et al., 2002). This trend is probably emerging in other states, given that investment in public health care services in India has remained low –even by developing countries standards (World Bank, 2001) – declining from 1.3% to 0.9% of GDP between 1990 and 1999 (Government of India, 2003).

Health has traditionally been a major government spending item in Kerala. But throughout the 1980s and 1990s the share of domestic state product allocated to health care dwindled, (Varatharajan et al., 2002) and capital investments in that sector levelled off (Narayana, 2001). In a highly technology-oriented context and with evermore costly health care consumables, private sector hospitalisations have been filling the gap in access. Idle capacity has been found among public hospitals and this potential remains untapped due to human resources shortages, accessibility problems, lack of funds for maintenance and inappropriate utilisation of staff (Varatharajan et al., 2002). The use of public hospitals can be optimised in Kerala. Rather than increasing overall facilities, action should be taken to ensure quality, namely structuring urban primary health care, setting up a proper referral system, and making sure personnel and treatments are made available. Our study suggests

that the public sector still plays an important role for sub-section of the population and in the case of long-term hospitalisations.

### *Segmented markets of care*

Reliance on private care is not universal. Members of poor households and of homes relying on casual work as a main source of income have a higher propensity to enter free wards of public hospitals. This is in line with the finding that 66% of hospital bed days for those below the poverty line are spent in public facilities compared to only 44% for those above the poverty line (Mahal et al., 2001). The market is segmented between public and private sectors in urban Kerala. People tend to be hospitalised and followed-up on in the sector they used for outpatient care. Our analysis provides preliminary evidence that private hospital patients have a slightly higher probability of crossing-over to the public sector for subsequent hospitalisations. Although private care might be their first choice, some individuals might not be able to afford it, especially if their condition requires long or recurring hospitalisations. This is suggested by lengthier durations of stay in paying public wards, compared to free public or private sector hospitalisations, especially for individuals from wealthier groups. Most of them were older patients, often from regular salaried status households, hospitalised for chronic diseases. Private hospitalisation might be too costly – even for the rich – when significant care is needed. In addition, crossing-over between sectors could be driven by professional advice, such as situation in which physicians provide outpatient care privately and refer patients to public hospitals where they also work. These hypotheses remain difficult to assess solely from cross-sectional data. Longitudinal surveys, looking at the complete health care history, could enable to further understand hospitalisation pathways and sequential care from both sectors.

There is growing concern about the development of a two-tier health care system in India: non-poor individuals show a higher propensity to resort to large public or private hospitals, while the poor are relegated to lower levels of care and turn to ill-qualified private providers (World Bank, 2001). Inability to pay restricts hospital care options for poor households. NSS data did not provide information regarding the specific public or private hospitals utilized and systems of medicine. However, studies have suggested higher perceived quality of care in private hospitals and general dissatisfaction with public sector

facilities (Narayana, 2001; Kunhikannan & Aravindan, 2000). Studies should assess the level of care available at the various facilities to provide a clearer picture of access to care.

#### *Variations across urban areas*

Finally, supply-side factors influence the Kerala health care market and can partly explain the segmentation between public and private sectors. Dominance of private beds at the district level, which concentrates in wealthier areas, is associated with higher odds of private hospitalisations. The density of beds in the private sector is highly correlated with literacy, district per capita income and high investments in the public sector (Kutty et al., 2000). Private health care is driven by an economic logic; therefore, supply of services is concentrated in areas with greater commercial potential. A high density of hospital beds – strongly correlated with the presence of a medical college and density of public beds – is associated with higher hospital attendance rates. The poor could thus face limited care options due to both locational disadvantages and financial constraints (Misra, 2003).

A limit of this study resides in the need to aggregate small towns into district level units for lack of specific identification of urban units. As for any types of health care utilisation, people could seek hospitalisation in neighbouring towns or districts. In this case, the results presented in this paper would represent an underestimation of the real association between urban characteristics and variations in hospitalisation sources in Kerala. Clear identification of urban units of residence and of hospitalisation would enable to better assess the impact of urban contexts on hospitalisations. Locally-relevant data and supply-side information in future NSS rounds would allow a better assessment of the impact of community characteristics and health care supply on access to hospital care.

NSS data did not enable us to determine the level of non-access to hospital care. This remains difficult to estimate from household surveys since hospitalisation often requires professional assessment. We therefore could not identify cases of forgone hospitalisations. Yet, districts with favourable economic indicators and those with private dominance accounted for a higher proportion of the NSS hospitalisation sample with regards to their population share. In addition, our analysis of hospitalisations could not distinguish



hospitalisations between systems of medicine - including allopathy, ayurveda and homeopathy -because of limits in the data gathered through the NSS survey.

### **Conclusion**

This paper reports the prominent share of the private sector as a source of inpatient care and the segmentation of public and private sectors for hospital care in urban Kerala. In the last decades, the trend has in part been accentuated by the disproportionate rise in the number of private beds compared with that of public beds. The concentration of the poor and the elderly in the public sector suggests that inpatient care can be a real burden and that appropriate investments are needed to provide affordable quality health care in government institutions, especially for those who cannot afford private care. It highlights that accessing care in specific sectors is not merely the result of personal preferences but depends on economic opportunity and supply factors. Lack of investment in public health facilities - and in the quality of care provided in public institutions - might exacerbate inequities in access between poor and well-off groups. A larger private sector cannot cater to the growing health needs of the whole population. Meanwhile, public institutions are faced with a daunting task: to meet the needs of an ageing society, where older individuals with chronic diseases resort to public health care. Other Indian states and developing countries, with similar health transitions and evolution of health systems, could face similar challenges in the near future.

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### Conflicts of interests and ethical aspects

An independent institutional ethical review committee has approved the research protocol. No nominal information has ever been in possession of research. Only non-nominal data have been used during the course of the analyses. Jean-Frédéric Levesque was financially supported by the Canadian Institute of Health Research (CIHR) and the Canadian Health Services Research Foundation (CHSRF) during the course of this study. No conflict of interest declared.

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## Appendix 1: Urban-level variables under study

Name	Operational definition	Categories	$N_j$	$n_i$	% of level-1 units
<b>Urban size</b>	Size of the urban units	Small towns (below 50,000 inhabitants)	12	386	55.6
		Medium town (50,000-199,999 inhabitants)	7	73	10.4
		Large town (200,000 inhabitants or more)	5	236	34.0
<b>Medical college district</b>	Presence of a medical college in the district	Yes	9	262	37.6
		No	15	433	62.4
<b>Total bed density</b>	Density of hospital beds (per thousand population) in the district	Low (below mean of districts)	15	147	21.2
		High (above mean of districts)	9	548	78.8
<b>Private-public bed ratio</b>	Ratio of hospital beds in the private sector to hospital beds in the public sector	Low (below mean of districts)	15	250	36.0
		High (above the mean of districts)	9	444	64.0
<b>Poor households</b>	Proportion of households below the poverty line in the NSS 52 <sup>nd</sup> round urban units	Low (below mean of districts)	17	517	74.4
		High (above mean of districts)	7	178	25.6
<b>Casual worker households</b>	Proportion of households with casual work as main source of income in the NSS 52 <sup>nd</sup> round urban units.	Low (below mean of districts)	15	606	87.2
		High (above mean of districts)	9	89	12.8
<b>Pucca housing</b>	Proportion of households living in a house made of permanent material ( <i>pucca</i> )	Low (below mean of districts)	4	107	15.4
		High (above mean of districts)	20	588	84.6

$N_j$  = number of urban-level units

$n_i$  = number of individual-level units

## Appendix 2: Individual-level variables under study.

Name	Operational definition	Categories	n <sub>i</sub>	%
<b>Hospitalisation</b>	Type of medical source of inpatient care	Free public wards	216	31.1
		Paying public wards	49	7.1
		Private hospitals	430	61.8
<b>Age</b>	Age at time of survey	Below 2 years old	35	5.0
		2-17 years old	110	15.8
		18-49 years old	279	40.1
		50 years and older	272	39.1
<b>Sex</b>	Sex	Female	328	47.3
		Male	366	52.7
<b>Caste</b>	Member of a scheduled caste or scheduled tribe (SC/ST) household	Scheduled caste or tribe (SC/ST)	55	8.0
		Other castes	636	92.0
<b>Poverty</b>	Household with monthly consumption below the poverty line	Poor (below poverty line)	162	23.4
		Non-poor (above poverty line)	436	62.8
		Upper non-poor (3X poverty line)	96	13.8
<b>Livelihood</b>	Type of employment reported as main source of income in the household	Casual work	265	38.1
		Non-casual work	428	61.6
<b>Chronic disease</b>	Diseases lasting for over 30 days	Acute illness	436	62.7
		Chronic illness	259	37.3

n<sub>i</sub> = number of individual-level units

# Affording what's free and paying for choice: the cost of hospitalisation episodes in urban Kerala

This paper has been submitted to the *International journal of health planning and management* and is currently under peer review.



## Affording what's free and paying for choice: the cost of hospitalisation episodes in urban Kerala.

Jean-Frédéric Levesque, Slim Haddad, Delampady Narayana and Pierre Fournier

### ABSTRACT

**Objective** To assess the cost of hospital care episodes in urban Kerala. Discuss policy implications of disparities in economic access to health care.

**Methods** The NSSO survey on health care (1995-1996) for urban Kerala was analysed with regards to expenditure incurred by hospital episodes. Multilevel linear models were built to assess factors associated with levels of health expenditure.

**Findings** Hospitalisation in Kerala involves paying admission fees in 68% of cases (98% in private and 20% in public sector). Poor households and those headed by casual workers showed significantly lower levels of health expenditure and a higher proportion of health-related loss of income than other social groups. Although there is significant expenditure in both sectors for these groups, hospitalisation on free public wards is associated with lower expenditure than other options. Factors linked with higher expenditure are: duration of stay; hospitalisations on paying public wards and in the private sector; hospitalisations for above poverty line households; and hospitalisations for chronic illnesses. Expenditure for services bought from outside the hospital is important in the public sector.

**Conclusion** Hospitalisation incurs significant expenditure in urban Kerala. Greater availability of free medical services in the public sector and financial protection against the cost of hospitalisation are warranted.

**Keywords:** Access to health care; Poverty; India; Urban health services; Private sector

### Introduction

Access to care is associated with economic status in developing countries, a situation which particularly affects the poor (Pannarunothai & Mills 1997; Pillai & al 2003). Increasing income inequalities and growing private health care sectors - without corresponding investment in public services or insurance coverage - limit access to affordable care and contribute to the impoverishment of vulnerable populations (McDade & Adair 2001; Ranson 2002; Russell 1996).

In health systems where out-of-pocket money is the predominant source for meeting medical costs, the opportunity to reach and obtain appropriate health care services is constrained by the ability to pay. Such is the case in India, where private health expenditure accounts for 82% of total health care spending (Sekhri & Savedoff 2005). Private health care expenditure has grown exponentially in recent years, increasing from 195 to 1283 billion Indian rupees (INR) between 1994 and 2003 (Bhat & Jain 2004). More than 40% of

hospitalised patients have to borrow money or sell household assets to meet health expenses, and an average of 24% are impoverished in the process (Peters et al. 2004). Other studies have suggested that lower income households are less inclined to seek treatment; also, when compared to their wealthier counterparts, they spend higher proportions of income on health care, and catastrophic expenditure is common (Garg 1998; Ramaiah et al. 1999; Ranson 2002; Bhatia & Cleland 2001).

The State of Kerala, in South India, shows higher rates of hospitalisation per thousand people than most Indian states (NSSO 1998; NSSO 2006). It also has among the highest density of medical facilities and beds in India in both the public and private sectors (Bhat 1999). Public hospitals account for only 40% of hospitalisations (Varatharajan et al. 2002; Kutty 2000) while a fair proportion of the poor and non poor use the private sector (Krishnan 2000). A study from the World Bank suggests that Kerala is the state with the most equitable distribution of public resources, the poor utilising roughly the equivalent of their share in population (Mahal et al. 2001). Other studies looking at total health expenditures have suggested that the Kerala health system favours the rich (Kutty 1989).

There is limited evidence on the cost of hospitalisation in public and private sector hospitals in urban Kerala; few studies provide a detailed breakdown of direct and indirect costs or give distributions of expenditures across social groups and disease categories (Bhatia & Cleland 2001). In addition, the economic burden related to chronic diseases that are likely to affect an ageing population has not been assessed. This paper seeks to improve understanding of the economic cost of hospitalisation episodes in urban Kerala: How much does inpatient care for public and private sector hospitalisations amount to? Does the cost of hospital care vary depending on whether the disease is acute or chronic? What financial burden does hospital care place on poor and non poor individuals?

## **Methods**

We analysed the urban sample for Kerala from the 52<sup>nd</sup> round of the National Sample Survey Organization's health survey database (NSSO 1996). The NSSO questionnaire sought information on characteristics of individuals (such as sex, reporting of illness and

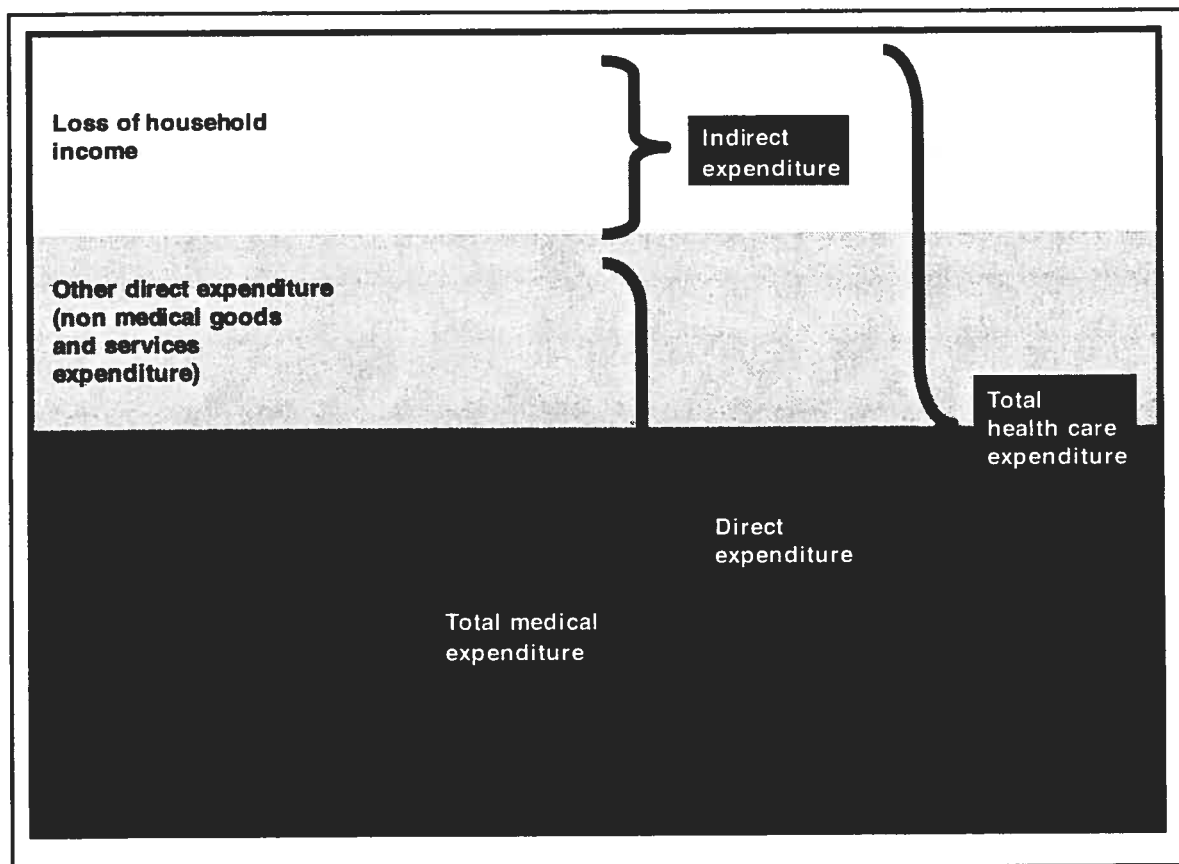
hospitalisation) and households (such as caste, household composition, consumption, health care expenditures). All cases reporting a hospitalisation in the previous 365 days were included for analysis ( $n = 695$ ). Information related to the sector of care, type of ward and health care expenditure was recorded for every hospitalisation episode. We classified cases of hospitalisation in three categories: hospitalisation in free wards of public hospitals (free public); hospitalisation in paying wards of public hospitals (paying public); and hospitalisation in private hospitals (private). Less than 2% of hospitalisations occurred in free wards of private hospitals and these were aggregated with paying private hospitalisations. Reasons for hospitalisation were aggregated to identify chronic (duration equal to or above 30 days) and acute illnesses (duration below 30 days).

To assess poverty status, we used household monthly consumption expenditure values provided in the NSSO database. Households with expenditure below the poverty line of 310 INR per capita per month (approximately 7 US dollars) were considered as being *poor*. This poverty line is the per capita poverty line estimated by the Planning Commission of India for 1993-1994 annualised for 1995-1996. We further classified *poor* households according to their consumption expenditure adjusted for household size and age composition using a standard equivalence scale of 1 for the first adult, 0.7 for subsequent adults, and 0.5 for children below 18 years of age (OECD 1982). Poor households –according to the monthly per capita consumption expenditure (MPCE) – rising above the poverty line after adjustment were considered to be *moderately poor*. Households remaining below the poverty line after adjustment were considered as being *very poor*.

Total health care expenditure for each hospitalisation episode was tabulated by aggregating direct (medical expenditure and other direct expenditure) and indirect expenditure (loss of household income) (cf. figure 1). Medical expenditure includes admission charges, payment for consumables and services (e.g. drugs, appliances and diagnostics) provided in the hospital as well as those bought from outside during hospitalisation. Other direct expenditure comprises transportation fare as well as food and lodging expenses. Indirect expenditure includes loss of household income. Of all hospitalisations, 98% incurred some form of expenditure and 95% entailed expenditure for medical services, either received from the hospital or bought outside. Outliers were identified and recoded into the ceiling

value (95<sup>th</sup> percentile). Information on health expenditure was missing for 2.3% of households and these were excluded from analyses.

Figure 1 Breakdown of health expenditure framework



All analyses were weighted by the inverse of the sampling fraction for each individual to correct for the two-stage stratified sampling in the NSS. Linear models were built to assess determinants of inpatient expenditures. Multilevel modelling was used to take into account the nested structure of the data, with episodes of hospitalisation (level 1) being nested within individuals (level 2). The modelling process was of increasing complexity, starting with an empty model and followed by the subsequent introduction of episode-level and individual-level variables. Statistical analyses were performed using SPSS 11.5 software (SPSS 2002) and MLwiN 2.0 (MLwiN 2003).

## Findings

During the 365 days preceding the survey, 6.2% of individuals from the sampled households reported a hospitalisation. Private hospitalisations accounted for 62% of all instances; the remaining 38% took place in public hospitals. Overall, some 32% of cases were admitted in free wards (hospital units or floors), most of them in the public sector. Yet, hospitalisations in paying wards of public hospitals represented 20% of public hospitalisations. The average length of stay was 10.5 days, with most hospitalisations having lasted between three and seven days (52%), a third between 8 and 30 days and only 5% having exceeded 30 days. Stays were longer for those admitted to public hospitals (8.5 days in the private sector compared to 13.7 days in free public and 14.7 days in paying public wards), for elderly patients, the chronically ill and for wealthier individuals. The main reported causes of hospitalisation were infectious diseases (30%), cardio-pulmonary illnesses (24%) and other chronic non-communicable diseases (CNCD) (16%).

Table 1 describes the characteristics associated with each category of hospitalisation. Factors associated with a higher proportion of free public hospitalisations are: belonging to a scheduled caste or tribe, working in a casual job, being very poor, suffering a chronic illness. Paying public hospitalisations were mostly seen in non scheduled castes or tribes, regular wage or salaried workers and wealthier households as well as in the chronically ill. Private users tended to be self-employed, from wealthier households, and acutely ill. Free public hospitalisation is associated with more hospitalisations exceeding 7 days. Although age showed a highly varied relationship with categories of hospitalisation, no difference in source of hospital care is found between sexes (data not shown).

Table 2 shows the distribution of types of health expenditure for hospitalisation episodes across sectors and social groups. Medical expenditure reaches an average of 72% of total expenditure, products and services bought from outside the hospital averaging 42% within this type. Public hospitalisations on free wards average roughly 43% of paying public hospitalisation and 58% of private hospitalisation. Paying public hospitalisations average 1.34 times the cost of private hospitalisations. Chronic illnesses incur 1.87 times the expenditure involved for acute illnesses. All types of expenditure increase with length of

hospitalisation and economic status; however poor groups show much lower expenditure levels. Casual worker household members tend to spend less overall than individuals from other employment groups. Expenditure consistently increases with age, regardless of type. There is no difference in expenditure between castes and between sexes except for indirect expenditure (loss of income) which is higher for males (data not shown).

Table 1 Description of users' characteristics by sector of hospitalisation

Variables	Categories	Sector of hospitalisation (%)			Pearson's $\chi^2$ statistics
		Public	Private		
		Free ward (n = 213)	Paying ward (n = 49)	(n = 425)	
All cases		31.2	6.9	61.9	$p \leq 0.05$
Caste	Scheduled castes (n = 55)	52.7	1.8	45.5	$p \leq 0.05$
	Other castes (n = 630)	29.4	7.3	63.3	
Household livelihood	Casual worker (n = 260)	45.4	5.4	49.2	$p \leq 0.05$
	Self-employed (n = 275)	24.0	5.5	70.5	
	Regular wage/salaried (n = 151)	19.9	12.6	67.5	
Economic status	Very poor (n = 32)	59.4	0	40.6	$p \leq 0.05$
	Moderately poor (n = 129)	36.7	4.7	58.6	
	Middle class ( $\geq$ PL < 3PL) (n = 434)	32.3	6.7	61.1	
	Rich ( $\geq$ 3PL) (n = 91)	7.8	13.3	78.9	
Type of illness	Acute illness (n = 431)	27.6	5.6	66.8	$p \leq 0.05$
	Chronic illness (n = 254)	37.0	9.4	53.5	
Reason for admission	Infectious (n = 211)	33.0	4.7	62.3	$p \leq 0.05$
	Cardiopulmonary (n = 162)	25.9	8.6	65.4	
	Other CNCND (n = 105)	39.0	10.5	50.5	
	Injury (n = 53)	33.3	13.0	53.7	
	Others (n = 154)	27.3	4.5	68.2	
Duration of stay	7 days or less (n = 420)	26.6	4.0	69.4	$p \leq 0.05$
	More than 7 days (n = 265)	38.3	11.7	50.0	

CNCND: chronic non communicable diseases

Table 2 Average expenditure by socioeconomic characteristics and sectors

Variables	Categories	Type of health care expenditure (INR)				Total
		Medical expenditure		Non medical expenditure		
		Hospital	Outside	Other direct	Indirect	
All cases		752	552	86	201	1810
Sector of hospitalisation	Public - free ward (n = 213)	101 <sup>a</sup>	573 <sup>a</sup>	77	245 <sup>a</sup>	1172 <sup>a</sup>
	Public - paying ward (n = 48)	946 <sup>a</sup>	924 <sup>a</sup>	116	309 <sup>a</sup>	2720 <sup>a</sup>
	Private (n = 425)	1057 <sup>a</sup>	500 <sup>a</sup>	87	167 <sup>a</sup>	2028 <sup>a</sup>
Duration of stay	1 day (n = 20)	230 <sup>a</sup>	263 <sup>a</sup>	41 <sup>a</sup>	31 <sup>a</sup>	565 <sup>a</sup>
	2 days (n = 46)	364 <sup>a</sup>	109 <sup>a</sup>	43 <sup>a</sup>	57 <sup>a</sup>	585 <sup>a</sup>
	3-7 days (n = 354)	515 <sup>a</sup>	325 <sup>a</sup>	66 <sup>a</sup>	169 <sup>a</sup>	1223 <sup>a</sup>
	8-30 days (n = 228)	1095 <sup>a</sup>	853 <sup>a</sup>	113 <sup>a</sup>	282 <sup>a</sup>	2599 <sup>a</sup>
	> 30 days (n = 37)	1671 <sup>a</sup>	1589 <sup>a</sup>	180 <sup>a</sup>	291 <sup>a</sup>	4782 <sup>a</sup>
Type of illness	Acute illness (n = 431)	638 <sup>a</sup>	380 <sup>a</sup>	62 <sup>a</sup>	183	1367 <sup>a</sup>
	Chronic illness (n = 254)	945 <sup>a</sup>	845 <sup>a</sup>	126 <sup>a</sup>	232	2561 <sup>a</sup>
Caste	Scheduled castes (n = 55)	501	542	70	297	1644
	Other castes (n = 630)	773	552	87	193	1824
Household livelihood	Casual worker (n = 260)	494 <sup>a</sup>	518	69	239 <sup>a</sup>	1461 <sup>a</sup>
	Self-employed (n = 275)	901 <sup>a</sup>	564	96	206 <sup>a</sup>	2046 <sup>a</sup>
	Regular wage/salaried (n = 151)	923 <sup>a</sup>	590	96	126 <sup>a</sup>	1981 <sup>a</sup>
Economic status	Very poor (n = 32)	88 <sup>a</sup>	203 <sup>a</sup>	72 <sup>a</sup>	70 <sup>a</sup>	490 <sup>a</sup>
	Moderately poor (n = 129)	309 <sup>a</sup>	262 <sup>a</sup>	50 <sup>a</sup>	120 <sup>a</sup>	767 <sup>a</sup>
	Middle class ( $\geq$ PL < 3PL) (n = 434)	785 <sup>a</sup>	593 <sup>a</sup>	87 <sup>a</sup>	228 <sup>a</sup>	1873 <sup>a</sup>
	Rich ( $\geq$ 3PL) (n = 91)	1460 <sup>a</sup>	894 <sup>a</sup>	136 <sup>a</sup>	237 <sup>a</sup>	3467 <sup>a</sup>

<sup>a</sup> ANOVA  $p \leq 0.05$ 

CNCD: chronic non communicable diseases

Table 3 presents the results of hospital expenditure multiple regression modelling. Factors associated with higher hospital medical expenditure (expenses paid to the hospital) include: paying public and private sector, higher economic status, and hospitalisation of rich individuals with chronic illnesses. Greater medical expenditure for services bought from outside the hospital was significantly associated with paying public hospitalisations, well-off households, and wealthy individuals with chronic illnesses (interaction). Finally, higher total health care expenditure is mostly associated with paying public and private hospitalisations, higher economic status and hospitalisation for chronic illnesses for middle class and rich individuals. Chronic illnesses proved to be a predictor of expenditure only in

interaction with economic status. Age, household livelihood and rank of hospitalisation were dropped from the final model. The two-level models explained a good proportion of variance ( $R^2$  between 0.23 and 0.33) and a significant intra class correlation for all types of expenditure (ranging from 64% to 75%). Inclusion of variables in models significantly reduced the level 2 variance (26% to 36% reduction). All models remained stable using bootstrapping, with only four coefficients losing significance.

Table 3 Predicted values of health expenditure (multilevel linear models)

Fixed factors	Categories	Model 1 Hospital medical expenditure (INR)	Model 2 Outside medical expenditure (INR)	Model 3 Total health care expenditure (INR)
Intercept		-494	97	-264
Duration of stay (REF 7 days or less)	> 7 days	699 [557;841]	534 [424;645]	1587 [1306;1867]
Hospital (REF Free public)	Paying public	534 [251;823]	249 [30;468]*	823 [265;1379]
	Private	1015 [845;1185]	0 [-126;125]	1007 [683;1331]
Type of illness (REF acute)	Chronic illness	-12 [-343;319]	42 [-207;292]	-10 [-648;627]
Economic status (REF poor)	Middle class	261 [42;479]	134 [-29;296]	507 [91;922]*
	Rich ( $\geq 3$ PL)	647 [323;969]	390 [151;630]	1376 [763;1990]
Type of illness/ Economic status interaction	Chronic/ Middle	215 [-163;593]	242 [-44;528]	749 [19;1478]*
	Chronic/ Rich	550 [16;1084]*	411 [7;815]*	2286 [1256;3316]
Intra class correlation (ICC)		0.75	0.64	0.70
Reduction in level 2 variance		34%	26%	36%
$R^2$		0.32	0.23	0.33

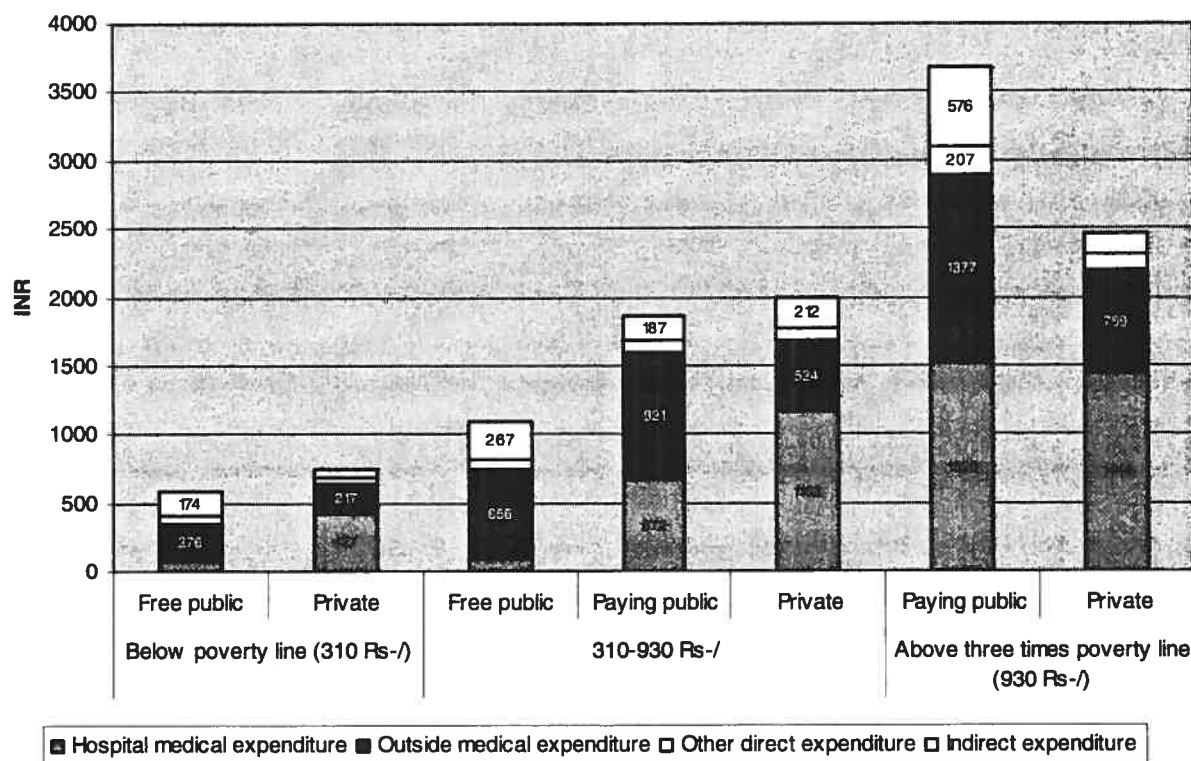
\* Coefficient not significant in the bootstrap models

Graphs 1 and 2 present the levels of hospital medical, *outside* medical, other direct and indirect expenditures for each category of hospitalisation across economic groups and type of illness. There is overall higher expenditure among wealthier individuals. Free public hospitalisations are associated with very low levels of expenditure for goods and services bought from the hospital. However expenditure for goods and services bought from outside accounts for a larger share than in the private sector and considerably reduces the difference



between these two categories. Although the private is associated with higher health expenditure than the public sector categories –except for the richest group– the difference remains low. This is especially true for the poor: out of the total expenditure entailed by free public hospitalisation, outside medical expenditure accounts for 46% and indirect expenditure for 29%; these figures show a reduction of the gap with the higher hospital costs of private hospitalisations. For middle class individuals, paying public hospitalisation involves the same total health expenditure as private hospitalisation, although a higher proportion is spent outside the hospital (51% in public compared to 26% in private). Public hospitalisations of the rich incur much higher expenditure, again mostly the result of *outside* medical expenditure and indirect expenditure.

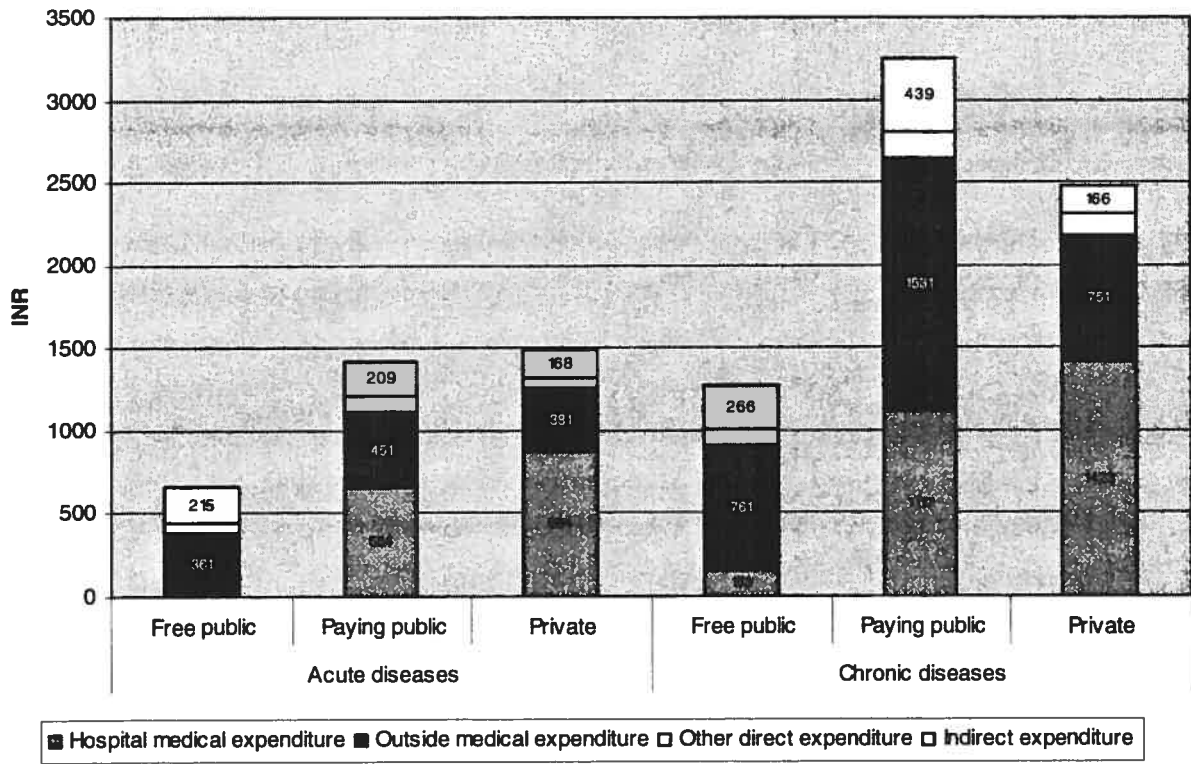
Graph 1 Breakdown of expenditure by economic groups and sector of hospitalisation



The breakdown of expenditure across types of hospitalisation for acute and chronic illnesses (cf. graph 2) shows higher expenditure for chronic diseases in each category of hospitalisation. For acute illnesses, paying public and private hospitalisation do not differ much in average total health expenditure and in the distribution across types of expenditure. As for chronic illnesses, there is higher expenditure on paying wards of public hospitals

mostly due to expenditure from the outside (46% of total health expenditure compared to 30% in private). If public hospitalisation incurs high levels of expenditures for services bought from outside the hospital and higher indirect expenditure (mostly loss of income), the difference across acute and chronic illnesses is less than across socioeconomic groups (shown in graph 1). Overall, the major difference among cases of either type of illness is between free and paying categories of public hospitalisations, emphasising the association of expenditure with capacity to pay in both types of illness.

Graph 2 Breakdown expenditures by type of illness and sector of hospitalisation



**Discussion**

*The cost of inpatient care in urban Kerala*

Hospital care involves high levels of expenditure in urban Kerala, even in the public sector. High levels of expenditure in public sectors have been found in other developing countries (Hotchkiss & Gordillo 1999; Abel-Smith & Rawal 1992; Killingsworth et al. 1999; Nahar & Costello 1998; Khan 2005; Lönnroth et al. 2001). Our study suggests that exemptions

from admission fees and inpatient services charges (mostly drugs provided for free) significantly lighten the economic burden of public hospitalisations for the poor. Yet expenses for services bought from outside the hospital remain prevalent for most public users - poor and non poor alike – and result in high health care expenditure in the public sector. In the private sector, most patients pay for admission, inpatient services and goods and services from outside the hospital –such as drugs, diagnostic tests and various health care appliances and furniture. Private services are associated with higher expenditure but the differences in expenditure between the public and private sector remain relatively small in absolute terms.

Our results suggest that outside medical expenditure represents a significant share of the health expenditure incurred by patients in both sectors. For example, among free public hospitalisations, partial or full payment is required in 75% of cases for drugs received during hospitalisation and in nearly 70% of cases for diagnostic tests (data not shown). This is concordant with a reported lack of availability of drugs in public hospitals and the widespread availability of drugstores in Kerala (Saradamma 2000; Abel-Smith & Rawal 1992; Hotchkiss et al 1998; Hotchkiss & Gordillo 1999). This greatly reduces the difference in economic burden associated with utilising public or private hospital care.

### ***Chronic diseases as a burden of care in urban Kerala***

Chronic diseases are associated with higher levels of expenditure than acute diseases in both the private and the public sectors. On average, hospitalisations for chronic diseases are associated with more expenditure in the private than in the public sector; however, hospitalisations due to chronic diseases among wealthier individuals are associated with much higher costs in public facilities than in the private sector. This is linked with the fact that hospitalisations of wealthier individuals in the public sector concentrate longer stays and older patients. Other studies have also found that long-term hospitalisations of the wealthy account for a large proportion of public sector hospital days (World Bank 2001).

Our study was able to distinguish between patients from free and paying wards. People with the ability to resort to the private sector seek public hospitalisation mostly for chronic

diseases. In such circumstances, non poor individuals and chronically ill patients experience longer stays and face much higher expenditure than those observed for both private and free public hospitalisations. This suggests that hospitalisations for chronic diseases in the private might prove too expensive for many non poor households or that public health care might be more attractive in the specific case of chronic diseases. The end result is that paying public hospitalisations incur higher expenditure than private ones in urban Kerala. Another study had suggested that public hospitalisation can be associated with higher average expenditure than some types of private providers in Tanzania (Abel-Smith & Rawal 1992). Nevertheless, access to private hospital care for chronic diseases entails an opportunity cost that few poor individuals can afford.

Our results further highlight the fact that infectious diseases remain an important cause of morbidity, accounting for 31% of all hospital admissions and 32% of free public hospitalisations in urban Kerala. In our study, chronic illnesses represented roughly one third of hospitalisations but two thirds of expenditure, suggesting a similar overall economic burden for acute and chronic illnesses in Kerala.

### *Affordability of care for the poor*

The poor and casual worker household members resort more to public hospital care but face significant health care expenditure in both sectors. Although private hospitalisation represents a costlier option, public hospitalisation remains a burden. In a state like Kerala - where private supply is much higher than public supply - accessing the public sector probably remains the sole option for many, for lack of real capacity to utilise private services. This is further supported by evidence from studies in Mumbai suggesting that those who resort to public hospitals, especially the poor, justify their choice by affordability reasons in a majority of cases (Dilip & Duggal 2004; Yesudian 1999). The fact that public sector hospitalisations involve important expenditure suggests that for many poor - without the means or the borrowing capacity to pay for health care - being hospitalised is either out of reach or could entail significant impoverishment in both the private and public sectors. Our study suggests that the poor utilising the private sector might be doing so at the compromise of the duration of hospitalisation, as indicated by shorter average lengths of

stay and lower hospital expenditures. The poor spend much less in absolute terms than other economic groups and have a much narrower spectrum of expenditures as most of them are concentrated around the median expenditure (data not shown). This could suggest a lack of capacity in mobilising resources for health care among the poor. Other studies in India and the subcontinent have also suggested that poor households spend more in share of income than their rich counterparts, despite higher morbidity levels and lower absolute expenditure (Ranson 2002; Garg 1998; Khan 2005).

### ***Policy implications***

In the wake of its success in reducing mortality (Ramachandran 1996), Kerala faces the coexistence of *diseases of poverty* and *diseases of affluence*, a situation which may be triggered by the ageing of the population and the fact that still large numbers of Keralites belong to lower socio-economic groups (Micheal & Singh 2003; Dilip 2002). Chronic conditions, such as type II diabetes, hypertension and coronary heart diseases are rising in urban areas, alongside risk factors such as obesity, a sedentary lifestyle, elevated serum lipids and smoking (Kutty & al 2000; Zachariah & al 2003; Joseph & al 2000; Boutayeb & Boutayeb 2005). These chronic diseases are not restricted to the richer segments of developing countries' populations since the poor show a strong prevalence and high rates of complications for many of these conditions (Pearson 1999; Ramachandran et al. 2002). There are concerns over the capacity of public systems to respond to the needs of this population, both in terms of chronic diseases management and end-of-life care (Sureshkumar & Rajagopal 1996; Bollini & al 2004; Boutayeb & Boutayeb 2005).

The cost of health care has increased drastically in recent years in Kerala. Evidence from the NSS data suggests that the cost of inpatient and outpatient care respectively grew at 26-31% and 15-16% annually between 1987 and 1996 (Gumber 2001). Since inpatient care only accounts for about 40% of total health care costs in the population (Garg 1998), our study most probably underestimates the real burden of care in urban Kerala. Yet, important implications arise.

The public sector in Kerala should increase the availability of drugs and medical supplies in order to reduce expenditure bought from outside the hospital. This would provide a real alternative for free hospital care for those who cannot afford the cost of medical treatment. Given that India remains among the lowest spenders with regards to public contribution – despite recent pressures to increase budgetary allocations (Bhat & Jain 2004) – increasing budgetary allocations to public hospitals could only prove to be a partial solution.

India and state level governments contribute only 0.9% of GDP towards health –one of the lowest health expenditures by any government in the world– compared to an average of 2.8% for developing countries (Bhat & Jain 2004). Public spending on health care in India amounts to less than 100 Indian rupees (INR) (around 3 US \$) per capita per year. Furthermore, more than 80% of government budgets are earmarked for salaries, leaving very little funds for drugs and other consumables (Devadasan et al. 2004). The per capita government health expenditure in Kerala has been among the highest of any Indian state (Garg 1998). Yet, as a proportion of State Domestic Product, public health care expenditure decreased by 35% between 1990 and 2002. This places Kerala among one of the states with the highest reduction in public contribution and the highest rise in private funding for health care, along with Karnataka, Tamil Nadu and Andhra Pradesh (Bhat & Jain 2004).

Another important implication is the need for some financial protection, even for publicly provided services, so that households have real choices for health care and do not face impoverishing expenditure. Various options have proven beneficial in improving the poor's access to hospital care in India and other countries (Ranson 2002; Hardeman et al. 2004; Kawabata et al. 2002; Preker & Carrin 2004; Van Damme et al. 2004; Xu et al. 2003). Such measures could be adopted in Kerala: providing protection, either through social insurance or community-based insurance schemes, and financial protection through pooling mechanisms could reduce the barriers to care, in a context where out-of-pocket expenditure is widely prevalent in both the public and private sector.

A health insurance scheme for the poor has recently been proposed in Kerala. Under this plan, hospital expenditures in both the public and private sectors would be covered for 5 members of a poor family against a premium of 33 Indian rupees (around 0.75 US \$). The

aim is to alleviate the burden of care for the poor. Yet, an important issue is whether this plan would cover expenses from outside the hospital during a hospitalisation episode. Our study clearly suggests that such should be the case, since this is where most of the public sector expenditure is incurred. Furthermore, hospitalisations often involve outpatient care consultations before admission and after discharge. Outpatient care is not currently covered by the insurance scheme proposal; yet, it is an important cause of impoverishment in Kerala (Thomas, 2005). Finally, the extent to which the insurance scheme could encourage the demand for private services among the poor –in a situation of higher perceived quality of care in the private sector– remains to be assessed. Increasing availability and quality of services in the public sector would be crucial to maintain or increase the public sector's role. Whether this scheme is enacted in the future remains to be seen.

### **Conclusion**

Inpatient care represents a heavy burden in urban Kerala. The public sector mitigates some of this burden, by providing more free services. The private sector, generally associated with higher expenditure than the public sector, is often out of reach. The concentration of the poor in the public sector and the economic burden they face for inpatient care suggests that appropriate investments are necessary to provide affordable quality health care in government institutions. In Kerala, the economic burden related to chronic diseases is important, so investment in the public sector's capacity to manage chronic illnesses at low cost for the poor, or those who could fall into poverty as a result of hospitalisation, is warranted. This calls for the planning of sustainable and affordable public healthcare services in urban areas and the development of financing mechanisms ensuring that the poor have similar choices and opportunity.

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## Conflicts of interests and ethical aspects

An independent institutional ethical review committee has approved the research protocol. No nominal information has ever been in possession of research. Only non-nominal data has been used during the course of analyses.

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## 6 DISCUSSION

The objective of this study was to assess disparities in access to health care - and its economic burden - and identify individual and urban attributes that facilitate or impede access to health care, especially for the poor. We have presented the results of an analysis of NSS data 52<sup>nd</sup> round for the urban sector in Kerala. They were presented in three separate papers focusing respectively on utilisation of outpatient care, the sources and pathways of inpatient care and hospitalisation expenditures. Each paper discussed the results from the analyses - in light of the existing literature - with regards to the contribution to the scientific knowledge on health care and implications for health care policy in urban Kerala. At the outset, we formulated three sets of study questions and related hypotheses. The first set of questions pertained to the role of poverty on access to health care and the barriers to health care experienced by the urban poor. The second pertained to the assessment of variations in access to health care across urban contexts and to the role of urban attributes and health care sectors on these variations. The third was about the economic burden of hospital care across social groups and health care sectors. Each paper contributed to some extent to address these questions.

In this section, we discuss - grouping the papers' results and complementary analyses - the contributions to our understanding of access to health care in urban areas in general, and for the poor in the urban milieu. We will systematically consider our results in relation to the hypotheses stated at the outset. This discussion will avoid repeating the observations made in individual papers as much as is feasible. The reader is invited to return to each paper for the detailed discussion in relation with the literature specific to each paper. In addition, table 6.1 and 6.2 summarize the study questions, papers' sub questions, study hypotheses and findings that will be discussed in this section. The first part discusses individual and household determinants of access and brings together the results related to poverty. The second part discusses the role of the urban environment on access to health care and synthesizes findings related to urban poverty and supply of services. A special attention is given to medium size towns. The third part reviews the evidence related to the economic burden of hospital care. In the fourth part, we will briefly discuss the limits and strengths of this study and highlights some aspects that warrant further studies. Finally, we present some thoughts about the conceptual framework adopted at the outset.

Table 6.1 Overview of study questions, sub questions and hypotheses

Study questions	Papers sub questions	Hypotheses
1) What are the individual and household characteristics associated with barriers to access to health care in urban Kerala? What are the specific barriers to access for the urban poor and economically deprived?	<ul style="list-style-type: none"> <li>• What is the poorest's situation with regards to access to health care? [Paper 1]</li> <li>• Do urban dwellers, regardless of their economic status, choose equally between the range of public and private providers? [Paper 1]</li> <li>• With a broad range of public and private institutions, are the same options available to all, regardless of economic status? [Paper 2]</li> </ul>	1) Despite progresses made in terms of human development and a generally favourable environment, disparities in access remain in Kerala. Even in a context of high availability of health services, deprived populations - such as the poor, casual worker and scheduled caste/schedule tribe (SC/ST) - are subjected to barriers to access to health care in Kerala (1a); and their access to health care is particularly restricted in the private sector (1b).
2) Does access to health care vary across urban contexts in Kerala? What are the urban characteristics associated with restrictions in access? What is the role of urban size and other urban attributes on variations in access to health care? What is the role of public and private urban health systems on variations in access to health care?	<ul style="list-style-type: none"> <li>• Which urban characteristics are more conducive to access to care? [Paper 1]</li> <li>• Does the city of residence influence access to care? [Paper 2]</li> <li>• What pathways are taken to access hospital care in cities? [Paper 2]</li> </ul>	2) Because of lower availability of public and private health services, inhabitants from small towns, urban areas with low proportion of permanent houses and high proportion of deprived populations have lower access to health care in Kerala (2a); and their access to health care is particularly restricted in the private sector (2b).
3) What is the economic burden of hospital care across social groups and across sectors of care in urban Kerala? To what extent, is hospital expenditure a burden for the poor?	<ul style="list-style-type: none"> <li>• How much does inpatient care for public and private sector hospitalisations amount to? [Paper 3]</li> <li>• Does the cost of hospital care vary depending on whether the disease is acute or chronic? [Paper 3]</li> <li>• What financial burden does hospital care place on poor and non poor individuals? [Paper 3]</li> </ul>	3) Because of higher availability of health services, inhabitants from cities having a wider range of public infrastructure and urban areas with high density of public hospital beds have higher access to health care in Kerala (3a); and their access to publicly provided services is higher (3b).
4) Given that prices of services are high and that financial protection against illness and health care costs is low, the economic burden related to hospital care is expected to be high in urban Kerala. We hypothesize that the economic burden of health care is going to be higher in the private sector (4a); for chronic illnesses (4b); and for economically deprived individuals (4c).		

Table 6.2 Study hypotheses and summary of findings

<p>1a) Despite progress made in terms of human development and a generally favourable environment, disparities in access remain in Kerala. Even in a context of high availability of health services, deprived populations - such as the poor, casual worker and scheduled caste/schedule tribe (SC/ST) - are subjected to barriers to access to health care in Kerala;</p>	<ul style="list-style-type: none"> <li>• Affordability or availability reasons are given to explain unmet outpatient care needs</li> <li>• The very poor show lower levels of outpatient care utilisation</li> <li>• Younger age and severity of illness are associated with higher levels of outpatient care utilisation</li> <li>• No difference in outpatient care utilisation was found according to gender, education or caste</li> </ul>
<p>1b) and their access to health care is particularly restricted in the private sector.</p>	<ul style="list-style-type: none"> <li>• Reasons for private outpatient care use are related to availability especially for the poor</li> <li>• The very poor show lower levels of private outpatient care utilisation</li> <li>• Casual work status is associated with lower propensity to utilise a private source of outpatient care</li> <li>• Casual work and poverty status are associated with free public hospitalisation</li> <li>• No difference in sources of outpatient or hospitalisations were found according to gender, education or caste</li> </ul>
<p>2a) Because of lower availability of public and private health services, inhabitants from small towns, urban areas with low proportion of permanent houses and high proportion of deprived populations have lower access to health care in Kerala;</p>	<ul style="list-style-type: none"> <li>• Medium towns show lower levels of utilisation of outpatient care in face of perceived ailments</li> <li>• There is no significant relationship between urban size and source of outpatient care utilisation</li> <li>• Low public density and high private density linked with private outpatient care utilisation</li> <li>• Medium towns and low pucca housing urban units are associated with lower outpatient care utilisation</li> <li>• Urban units with high proportion of poor tend to show lower outpatient care utilisation</li> <li>• Individuals from wealthier districts report higher rates of hospitalisation</li> </ul>
<p>2b) and their access to health care is particularly restricted in the private sector.</p>	<ul style="list-style-type: none"> <li>• Medium towns are associated with higher levels of free public hospitalisation</li> <li>• High pucca housing associated with private hospitalisation</li> <li>• Community economic status linked with increasing private outpatient care utilisation and private hospitalisation</li> </ul>

Table 6.2 Study hypotheses and summary of findings (suite)

<p>3a) Because of higher availability of health services, inhabitants from cities having a wider range of public infrastructure and urban areas with high density of public hospital beds have higher access to health care in Kerala;</p>	<ul style="list-style-type: none"> <li>• Medical college, low total bed density and low private-public bed ratio urban units are associated with free public hospitalisation</li> <li>• Private dominance of hospital beds is associated with private hospitalisation</li> </ul>
<p>3b) and their access to publicly provided services is higher.</p>	<ul style="list-style-type: none"> <li>• There are very few cross-over during an illness episodes in source of care before, during, and after hospitalisation</li> <li>• There is slightly more exits from the private to the public sector during the course of an illness episode than exits from the public to the private sector</li> <li>• Private hospitalisations are associated with higher levels of post-hospitalisation outpatient care</li> </ul>
<p>4a) Given that prices of services are high and that financial protection against illness and health care costs is low, the economic burden related to hospital care is expected to be high in urban Kerala. We hypothesize that the economic burden of health care is going to be higher in the private sector;</p>	<ul style="list-style-type: none"> <li>• High levels of payments for hospitalisation</li> <li>• Need to pay for medical supplies in free public and private</li> <li>• Much lower expenditure in free wards and for the poor, controlling for other factors</li> </ul>
<p>4b) for chronic illnesses; 4c) and for economically deprived individuals.</p>	<ul style="list-style-type: none"> <li>• Expenditure is higher for chronic illnesses, especially chronic illnesses of wealthier individuals</li> <li>• Higher expenditure level for chronic illness, especially in public paying wards</li> <li>• Increasing gradient of expenditure with increasing economic groups</li> <li>• Restriction of range of expenditure for the poor</li> <li>• Poverty linked with shorter duration of hospitalisation</li> <li>• Much lower expenditure in free wards and for the poor, controlling for other factors</li> </ul>



## 6.1 Individual and household determinants of access to health care

Our study confirms high levels of utilisation of health care services for outpatient and inpatient care and the predominance of the private sector as a provider of care in urban Kerala. The proportion of people reporting non utilisation of health care services during the course of an illness is low and rates of hospitalisations are high. This is in line with the high geographic availability of medical services in Kerala. However, availability and affordability-related reasons are proposed to explain non utilisation of health care. Significant variation in utilisation of health care services and sources of care are found between social and economic groups - controlling for severity of illness and other covariates. Our study suggests that being poor, from a casual work status household and - to a lesser extent - belonging to a backward caste, are associated with restrictions of access to health care in urban Kerala.

### *The first hypothesis: barriers to access for the poor*

Our first hypothesis contrasted Kerala's remarkable human development track record with the possibility of remaining disparities in access to health care and barriers to access for poor groups. As stated in this hypothesis (Table 6.2) social and economic status play a determining role with regards to access. The poor - particularly the very poor - casual workers and members of backward castes are subject to barriers to access to health care in urban Kerala. These three factors, in fact, represent the main individual and household characteristics influencing access to health care - controlling for severity of illnesses and age - from our analyses. Even in a context of high density of health services, deprivation is a determinant of access to health care. Other aspects, such as gender and education, were not associated with disparities in utilisation and sources of care.

Poverty seems to play a particular role in restricting access to health care. This is exemplified by both abstention from utilisation of health services in situations of need for care - despite declaring higher proportions of serious illnesses - and restriction of choice with regards to sources of care. Poverty is associated with a higher reliance on public sector services for both outpatient and inpatient care, despite a perception of lower availability and

quality of public services. In a context where private utilisation seems the first option for most, poverty restricts options available to individuals and households with regards to care. This is not merely to say that the poor have less choice, but that in absence of choice, chances of facing barriers to access to health care are higher. If private facilities, which are more numerous than public ones, are the main source of supply of health services in general in Kerala, this is not clearly the case for the poor. There is a lack of availability of health care for the poor, since private infrastructures are not as prevalent in poorer areas, and the availability of public outpatient care is also questionable. We will come back to this point while discussing the influence of urban contexts on access.

We hypothesized that access to private services would be restricted for the poor. Corollary to this assumption was that the poor's access to health care would be better in the public sector. The higher propensity of poor individuals to consult in the public sector and very low levels of wealthy individuals doing so supports this hypothesis. In addition, the strong segmentation between public and private sectors - people tend to be hospitalised and receive their follow-up consultations in the sector they first utilised for outpatient care - also supports this assertion. The poor concentrate in the public sector while the non poor - particularly the rich - choose, in a majority of cases, private services. This is not to say that the public only serves the poor or that the private is used solely by the wealthy. Poor people do have access to the private sector and both sectors are utilised by poor and non poor individuals. However, the relative probabilities - as expressed by odds ratios found in our analyses - of consulting in the private sector are much lower for the poor, other factors being equal. A sizeable proportion of the poor use private services - despite the availability of public services found in Kerala - and the main reason expressed by the poor for this is the higher perceived availability of private services. This suggests problems with the availability of public services - or at least comparative differentials in availability between public and private sectors - reducing opportunity of public utilisation among the poor. As we will see later, this also has consequences on the economic burden of care for the poor.

We have found that this disparity between poor, non poor and wealthy individuals is more marked in the case of hospitalisation compared to outpatient care. This is true both for rates of utilisation and for the proportion utilising public or private services. If the poor have lower rates of outpatient care utilisation in case of illness, the discrepancy in rates of

hospitalisation is even greater, as shown by the skewed distribution of hospitalisations in favour of the wealthiest. Despite limits of population surveys in assessing inequalities in access to hospital care - because of difficulties in identifying cases of *non hospitalisation* despite *need* for hospitalisation - our results show that the disparities in hospitalisation rates between economic groups correlate with availability of services. The poor have lesser access to hospital care in urban Kerala.

With regards to sources of care, the proportion of persons utilising public services is lower for outpatient care than for hospitalisation. In addition, users of public outpatient care tend to be poorer than those hospitalised in public hospitals. Poverty is associated with free public hospitalisations while, for outpatient care utilisation, only the very poor statistically differ from non poor individuals. However, the fact that the moderately poor did not differ from non-poor for outpatient care could be the result of the small sample size. The moderately poor had lower rates of utilisation of outpatient care services and of choice of private facilities in descriptive analyses. Their odds ratios suggested a lower propensity to receive care and use a private provider. However, this association was not statistically significant when controlling for other factors. Larger samples could have provided enough statistical power to confirm, or refute this lower propensity.

These results corroborate other studies suggesting some barriers to access to care for the poor in Kerala (Pillai, Williams, Glick, Polsky & Berlin, 2003; Gupta & Datta, 2003; Saradamma, Higginbotham & Nichter, 2000; Krishnan, 2000; Kunhikannan & Aravindan, 2000). These results raise questions about what has been called the *Kerala model of development*. This model has been praised for contributing to a more egalitarian society. Our results suggest that, with regards to access to health care, the model is not as egalitarian as previously thought. Barriers to access to health care remain, and current public policies do not fully succeed in suppressing health-related inequalities. In a context of dwindling public expenditure and rising private expenditure, this is a further cause for concern.

Casual work status is another aspect related to deprivation in our study. In Kerala, these workers - mostly employed on a daily basis through informal arrangements - tend to be poorer and to come from backward castes. We expected casual workers to have lower access to health care and more barriers to access to private health care. Casual work status

consistently proved to be associated with lower levels of utilisation and a reliance on public services for care. However, when poverty was taken into account, the effect of casual work status on non utilisation of outpatient care was not statistically significant. Other factors considered casual work status is associated with public sector utilisation and free public hospitalisations in particular.

Based on our conceptual framework, this is important to consider, since it raises questions about the influence of occupational structure on both ability to pay and ability to reach health services. Casual workers could be a subset of the poor subjected to more barriers to access in urban Kerala. Occupational characteristics - such as the regularity of employment, amount of working hours, acceptability of being on sick leave etc. - could be associated with a reduced ability to reach facilities and seek health care for the casual worker. In addition, public and private sectors might accommodate to these barriers to health care differently. Further studies should pay attention to the impact of casual work on access.

Finally, there are very few differences between scheduled caste / scheduled tribes (SC/ST) people - two economically backward groups - and other castes members in our study. Most of the differences found in bivariate analyses disappeared when economic status was taken into account in multiple models. This is not to say that SC/ST do not face barriers to health care, but more that their disparities in utilisation of health care services and choices of source of care are mostly explained by their economic backwardness. Being poor would matter more than being part of these specific social groups. However, there are limitations in the nature of the available data on caste membership that we could use. NSS only collects information about belonging to scheduled caste/scheduled tribe (SC/ST) groups. It does not collect information about more specific caste categories - such as belonging to *Brahmin* castes. The proportion of SC/ST is only of about 10% in Kerala. Obviously, the remaining 90% of people could belong to castes varying greatly in social and economic status. The available data did not permit an assessment of this heterogeneity, in relation to access to health care.

In summary, the results of our study are in line with empirical findings from the various studies synthesized in the literature review looking at access to health care in urban areas of developing countries with regards to individual determinants of access to health care.

However, our analysis adds to this compendium of literature in two ways. First, it suggests that poverty and casual work status (another form of economic vulnerability) have independent effects on access to health care and that these effects remain when characteristics of environments, such as availability of services and urban level poverty are taken into account. There are more significant determinants of access to health care than mere geographic availability of services in urban areas of developing countries. Poverty and casual work seems to matter the most. The fact that these findings come from a context of high availability of services and high levels of consumption of care suggests that the barriers to access for the poor must be worse in other contexts in developing countries.

Secondly, the inequalities in access reported in our analyses somehow contradict the assumption that access to health care is not a problem in Kerala. Despite being known for its *good health at low cost*, the health care system in Kerala does not seem equally accessible to all. These findings suggest that the model of intervention in the health arena that Kerala has adopted - different from other states with regards to preventive and maternal care, yet similar with regards to the predominance of private providers for curative care - raises questions in the context of the health transition. More costly interventions pertaining to the curative roles of health systems also need to be tackled appropriately in order to guarantee access to health care in developing countries. A model based on primary health care - focusing on determinants of health and provision of health promotion and preventive services - has a clear impact on the health of a population. But it needs to be supported by a curative system which is equally accessible to ensure that curative care needs associated with a health-educated and aging population are met without creating inequalities.

#### *Gender and access to health care*

Studies have suggested that access to health care is restricted for women in various developing countries (Rossi-Espagnet, Goldstein & Tabibzadeh, 1991; Claeson, Bos, Mawji & Pathamanathan, 2000). There are no differences between males and females in terms of reporting illness, seeking health care in cases of illness, hospitalisation and choices of source of care in our study. In other words, males and females - controlling for other factors - show similar rates of utilisation in cases of illness and similar proportion of utilisation of public and private infrastructures. In addition, no significant differences in

hospital care expenditure were found between sexes, except for loss of income which was higher for males.

This is in line with the relative equality between males and females found in Kerala, and exemplified by various indicators reported in our literature review (NSSO, 2006). Kerala is a state where maternal and child care services are among the best in India. This has translated into high levels of supervised births and high immunisation coverage of children in Kerala (IIPS, 2000). From this we can hypothesize that females in Kerala benefit from a high level of knowledge about health and health care. In addition, although information with regards to attitudes towards care and social position of females was not available in our study, this consistent equality in utilisation and process of health care utilisation between sexes suggests that women do not suffer from barriers to access to health care related to their gender in Kerala.

According to our conceptual framework, this absence of disparities in utilisation between gender - taking severity of illness and economic factors into account - would suggest equal opportunity to choose health care services and sources of care. Apart from ability to pay, women do not face discrimination in their capacity to seek and choose a specific source of care. Other aspects related to the acceptability of health care specific to sexes have not been studied here and caution is needed in interpreting these results. Further studies - especially qualitative studies of health care utilisation processes - could provide significant insights about this opportunity of choice for women.

In summary, we have thus found that poverty and casual work status are associated with lower access to health care in urban Kerala. There was also a tendency for scheduled caste/scheduled tribe membership to be associated with reduced access to health care, although much of this association was related to economic deprivation. However, gender and education were not associated with barriers in access to health care.

A minor caution related to these individual determinants of access of health care is warranted however. Utilisation and non utilisation of health services - and the specific resources which are used - can be influenced by attitudes and preferences towards health and health care. Such information could not be assessed as part of this study. However, the

consistency of results between outpatient care and inpatient care - preferences are assumed to be less influential in determining choices for the latter - gives us confidence that these attributes have a significant role in determining access to health care. In addition, we have controlled for severity of illnesses and have analysed variables such as age and gender, which can be correlated with varying attitudes towards care. Finally, under the assumption that attitudes and preferences do not vary across groups as much as they vary between individuals - an assumption supported by reasons expressed for non utilisation and choice of source of care - we feel that these preferences would play a minor role compared to the identified factors.

## **6.2 The role of urban environment on access to health care**

In addition to individual and household level factors, our study suggests that characteristics of urban environments, such urban size, wealth, and the supply of public or private services also influence access to health care, utilisation, and choice of source of care. Our study suggests significant variations in access to health care between urban contexts in Kerala. Utilisation rates and sources of health care varied significantly across urban areas. This implies that urban areas are not homogeneous with regards to access to health care and that inequalities are found in urban areas. In addition to assessing the variability of access to health care *in* urban areas, our study aimed at identifying attributes *of* urban areas that facilitate or hinder access to health care. In this sense, our study did not simply use urban areas as a context of study, but also as an object of analysis.

We found that contextual variables - related to both the level of economic wealth or deprivation and the level of health services offered - explain a significant proportion of the variations we find between urban units. These variations are not solely the result of the fact that cities differ from each other with regard to their composition. They are also the result of the fact that they subject their populations to differing influences and circumstances. Urban areas can have different levels of access to health care because they concentrate people with more or less ability to utilise health services - such as cities with higher proportions of poor people - or because they subject their population to specific barriers - such as lower levels of infrastructure. This idea formed the basis of our interest for the

urban context and it relates to the second question we stated at the start: what urban characteristics restrict or promote access to health care? We will now consider these urban characteristics related to our second and third hypotheses.

*The second hypothesis: urban deprivation and access*

In the conceptual framework, social deprivation is introduced as a potential determinant of access to health care in urban areas. We expected inhabitants from urban units with low pucca houses and high proportions of poor to have lower access than inhabitants of economically advantaged communities. We found that inhabitants of disadvantaged urban areas have lower propensity to use health services in situations of need for care (Table 6.2). However, the influence of these variables is not as clear in the case of hospitalisations. Our results suggests that - irrespective of individual conditions - living in a poorer urban area - as measured by the proportion of poor, the proportion of pucca housing and an array of socio economic indicators - (Table 1 in paper 1; table 4 in paper 2) is associated with lower access to health care in Kerala.

This is exemplified by the specific situation prevailing in medium towns. Our second hypothesis assumed that small towns and urban areas concentrating economic deprivation would submit their population to more barriers to access to health care and restrictions in access to the private sector (Table 6.1). Corollary to this assertion was the expectation that populations from larger urban units - which are known to have wider ranges of health care facilities and higher density of services - would have higher access. This was partly found in our analysis for both outpatient care and inpatient care. While urban size and indicators of urban deprivation were found to be related to access to health care, it is in medium towns that lower levels of obtention of health care were found. Small towns tended to show similar levels of access to health care throughout the study compared to large towns. We found that the overall level of utilisation and the utilisation of private facilities were higher in small towns and large cities. Medium towns presented lower utilisation and hospitalisation rates and reduced levels of private utilisation.

Medium towns also seem to concentrate more vulnerability and have lower density of health infrastructure. Table 6.3 shows the main population indicators by size class of urban



units. Medium towns - which tend to have younger populations and poorer inhabitants - are concentrated in Northern Kerala, a region known to be more backward than Southern Kerala. This has clear implications for understanding the demand of health care services and implies that medium towns disadvantage in terms of access could be due to the fact that their inhabitants are poorer.

Table 6.3 Description of the urban population by class size of towns [95% C.I.]

		Small towns (n = 5786)	Medium towns (n = 1368)	Large towns (n = 3160)
Household livelihood	Casual work	43.1% [41.8 ; 44.4]	44.7% [42.1 ; 47.3]	32.2% [30.6 ; 33.8]
	Regular wage/ salaried	22.8% [21.7 ; 23.9]	22.4% [20.2 ; 24.6]	33.5% [31.9 ; 35.2]
Economic status	Very poor	4.2% [3.7 ; 4.7]	8.0% [6.6 ; 9.4]	0.5% [0.3 ; 0.8]
	Poor	18.0% [17.0 ; 19.0]	19.3% [17.2 ; 21.4]	12.8% [11.6 ; 14.0]
	Non poor	70.5% [69.3 ; 71.7]	64.2% [61.7 ; 66.7]	72.1% [70.5 ; 73.7]
	Wealthy	7.3% [6.6 ; 8.0]	8.5% [7.0 ; 10.0]	15.1% [13.9 ; 16.4]
House infrastructure	Pucca housing	79.9% [78.87;80.93]	84.1% [82.16;86.04]	82.6% [81.28;83.92]
	Tap source of drinking water	20.3% [19.26;21.34]	38.7% [36.12;41.28]	63.4% [61.72;65.08]
	Covered drainage/underground	8.4% [7.69;9.11]	17.7% [15.68;19.72]	27.4% [25.84;28.96]
Region of origin	North Kerala	39.7% [38.44;40.96]	73.4% [71.06;75.74]	19.1% [17.73;20.47]

However, our literature review highlighted the high level of decentralisation and a concentration of resources in rural areas - part of the primary care approach to development in the state. In the first paper, we raised the possibility that investments and decentralisation towards rural areas in Kerala could have benefited small towns, compared to medium-sized agglomerations and that most of the medical college infrastructure concentrates in larger cities. These medical colleges are mostly large hospitals. They account for the majority of public doctors in Kerala. As we will see in the next section, the supply of public services is a strong determinant of access to health care for economically deprived groups.

Medium towns concentrate in districts with low density of beds - especially in the private sector (Table 4 of paper 2). Inhabitants of medium towns wouldn't benefit from the same level of supply - as measured by density of beds. This combination of poverty - restricting demand for health care - and reduced offer has an obvious influence on access to health care. Table 6.4 shows the lower levels of utilisation of outpatient care, of private outpatient sources of care, and of hospitalisations and of private hospitalisation compared to other class size of towns. These results are fairly consistent across indicators.

Table 6.4 Health and health care outcomes by class size of towns [95% C.I.]

	Small towns	Medium towns	Large towns
Ailment during the last 15 days	9.2% [8.5 ; 9.9]	8.3% [6.8 ; 9.8]	7.8% [6.9 ; 8.7]
No utilisation of outpatient care in the last 15 days in case of ailment	17% [13 ; 22]	31% [19 ; 43]	10% [4 ; 15]
Public utilisation of outpatient care in the last 15 days in case of ailment	21% [16 ; 26]	20% [9 ; 31]	13% [6 ; 19]
Private utilisation of outpatient care in the last 15 days in case of ailment	62% [56 ; 68]	49% [36 ; 62]	77% [69 ; 85]
Hospitalisation in the last 365 days	6.4% [5.8 ; 7.0]	4.7% [3.6 ; 5.8]	6.7% [5.8 ; 7.6]
Public hospitalisation in the last 365 days	34% [29 ; 39]	50% [40 ; 60]	34% [28 ; 40]
Private hospitalisation in the last 365 days	66% [61 ; 71]	50% [40 ; 60]	66% [60 ; 72]

This realization that the medium towns' disadvantage with regards to access could result both from lower ability to pay for services and restriction in the amount of services available in the private sector raises questions: could it be the case that the private sector has not developed in medium towns because of lower ability to pay for - and therefore lower demand for - private care? The effect of urban size on access to health care should be the subject of further studies and NSS data should collect more information about the sampled urban units in order to better assess this situation.

Our study thus makes a clear initial contribution to the body of knowledge about the impact of urban contexts on access to health care. From our review of the literature, we have found that the few available studies looking into access to health care in urban areas have made suggestions regarding the impact of context on access (Fosu, 1989; McDade & Adair, 2001; Ecob & Macintyre, 2000; Duncan, Jones & Moon, 1996; Harpham & Tanner, 1995).

However, the literature is relatively poor the identification of the specific factors related to urban life which impede or promote access to health care in developing countries. Our study provides ground for a better understanding of such characteristics and to stimulate more research in this increasingly important area of study for the urbanising developing world.

We were able to identify - using routinely collected data in the Indian context - variations in access to health care across a range of urban areas. This happened in a context of high geographical availability of health resources. As such, it underlines the potential role of community-level development and the heterogeneity of the urban context in developing countries. This study advocates investing in better understanding of urban areas and in developing infrastructures adapted to their characteristics in order to ensure opportunities to access health care for their populations. However, our results are among the first empirical findings on the impact of contexts on access and should be considered cautiously. Given that urbanisation is a widespread and heterogeneous phenomenon, more studies should be done to clarify these aspects and the information routinely available from population surveys should be analysed with this objective in mind.

*The third hypothesis: the role of health system supply on access to health care*

One of our hypotheses pertained to the influence of density of hospital-beds on access to health care. The association of density of beds with access to health care differs between outpatient and inpatient care services. For outpatient care, density of beds was not associated with disparities in utilisation. Access to outpatient care was more influenced by urban attributes related to deprivation and wealth, as discussed in the previous section. However, the density of public and private beds was a significant determinant of the source of outpatient care.

The private sector has grown tremendously in recent decades and has tended to become established in wealthy urban areas. This correlation of density of private beds with literacy and per capita income has been observed previously (Kutty 2000). This increased availability of private services - in parallel with a deterioration of services in the public

sector - has generated an increased demand for private services and a decrease in the demand for public services. The analysis of hospitalisation sources also confirms this demand-induced utilisation of private services and suggests that, more than just the density of beds - used as proxy of offer - the predominance of private beds over public beds is associated with private utilisation, even in areas of high public bed density.

Overall, a predominant supply of private services at the district level is associated with higher rates of private hospitalisations, while a high total density of hospital beds - which is highly correlated with presence of a medical college and density of public beds - is associated with higher utilisation of the public sector for care. When considered in interaction with urban wealth, a clear gradient of increasing private utilisation for both outpatient and hospital care is evident as one moves from areas of public sector dominance to areas of private dominance and areas with unfavourable economic indicators to wealthier areas (Graph 2 in paper 2). Living in wealthy and private health service-rich urban areas is associated with higher access to care. The poor living in poorer areas therefore face a double challenge of (1) having lower ability to pay for health care and of (2) living in areas with lower availability of services, effectively restricting their opportunities to obtain health care.

It thus seems that urban areas of developing countries have complex health systems - heterogeneous in both their composition and distribution - and that living environments have an influence on access to health care both through their intrinsic characteristics and their location in relation to health infrastructure. This study makes a small contribution to better understand this impact of health supply in urban areas. Future studies should look into more micro and qualitative methodologies to better understand the complexities of urban health care systems and refine the understanding of their impact on access to health care for urban populations. In the Indian context, our study was among the first to address this issue.

Our results correspond with previous reports - highlighted in the literature review - that public institutions are minor providers of care in urban areas of developing countries, especially for outpatient care services (Thaver, Harpham, McPake & Garner, 1998; Mills, Brugha, Hanson & McPake, 2002). Our study adds to this by highlighting that it is mostly

private density of infrastructure that compels choices about sources of care in urban areas of developing countries. As such it does not involve problems in access. However, given that private providers respond mostly to market mechanisms (not necessarily population health care needs) in their patterns of development, it does not promote equity in access to health care for those living in environments with little economic potential for the private sector.

This finding is important for its implications for current policy in health care. Recent reforms of health care systems have tended to promote reductions in public spending on health care and an increasing reliance on private sectors for the provision of personal curative care. Through the process of rural-urban migration and natural increase in population, cities are growing and development of privately financed services without parallel investments in public infrastructure accessible for newly formed urban environments can generate inequalities in access to health care. Some urban developments could not promote the establishment of high quality private care as much as others.

Other developing countries - such as Sri Lanka - have maintained higher levels of public contribution to health and health care, with good results (Bhat & Jain, 2004). Our study suggests that investing in primary health care - despite showing good results in terms of improving the health of the population with regards to mortality indicators - is not sufficient. Governments in developing countries need to consider the impact of low public contributions in health on access to health care for the urban poor.

### **6.3 The economic burden of hospital care**

The third study question guiding our analyses pertained to the burden of hospital care across socio-economic groups and across sectors - public and private - in urban Kerala. A special emphasis is put on the economic burden for the poor. The relative burden that public and private utilisation represents and the contribution of chronic illnesses to this burden is also the focus of this section. The various analyses presented here confirm high levels of expenditure for hospitalisation in urban Kerala. Overall 98% of hospitalisations and 93% of outpatient care consultations involve health expenses for households.

The fourth hypothesis stated that - because of high prices and lack of financial protection - the economic burden of hospital care would be high in Kerala - especially in the private sector, for chronic illnesses and for the poor. Our analyses shows that the first two parts of this hypothesis are verified in the fact that private care is more costly overall than publicly provided services and that chronic illness involve higher levels of expenditure compared to acute illnesses. As for the third part of this hypothesis related to the economic burden for the poor, our analyses suggest that it is better analysed together with the other aspects of sector of hospitalisation and the chronic nature of illness. Here, we will discuss the economic burden for the poor across the public and private sectors and will then look more specifically at the economic burden related to chronic illnesses in both sectors. In this section, the discussion will draw on the results presented in paper 3 which will be complemented by complementary results.

*The fourth hypothesis: economic burden of care for the poor across sectors*

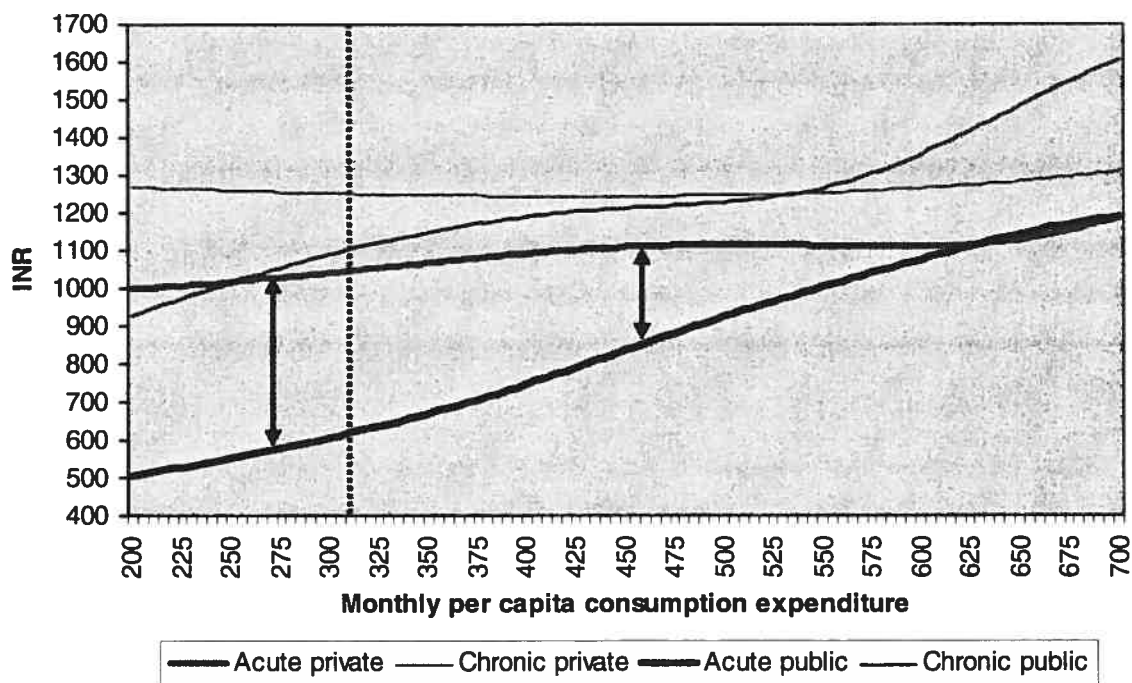
As expected, hospital expenditures are high in general and are lower in the public sector. In addition to disparities in utilisation rates and sources of health care, the poor suffer from significant economic barriers to health care. These can contribute to their unmet needs for care. Barriers to access to health care and higher economic burden related to health care effectively put the poor at a cumulative disadvantage. Those most at risk of being excluded from health care are also those experiencing the highest burden related to health care.

The distinction between free public and paying public hospitalisations has provided interesting insights into the specific economic burden of care for the poor. Free public hospitalisations - for the poor benefiting from waiving of user fees - still entail significant costs because of expenditures spent for services provided outside the hospitals during hospitalisations. In fact, the streets just in front of medical colleges and district hospitals are often lined with shops and offices offering medical drugs and appliances, as well as private laboratory and radiological services. These services - although available in theory - are often not provided in public institutions. Because people using public services have to buy private services from outside the hospital and of high prices of health services, Kerala has the highest public and private out-of-pocket expenditure of all Indian states (World Bank,

2001). This has eventually made several private services unaffordable for the poor and casual workers, restricted their set of health care opportunities and therefore pushed them to utilise less attractive but cheaper public sector services.

While fees paid to public hospitals are relatively constant across income groups, expenditure for services bought from the outside gradually increases with income in this sector. As a result, total expenditures for hospitalisations show a strong gradient, increasing gradually alongside economic status. A complementary analysis of hospital expenditure illustrates this increase in total expenditure with increasing income in the public sector - for both acute and chronic illnesses - compared to a relatively flat distribution in the private sector (Graph 6.1). From this graph, we can also see that choosing between private or public institutions for the poor is associated with a greater increase in expenditure - as shown by the arrows on each side of the poverty threshold (dotted line) - than it is for non-poor. Utilising private care is a costlier option for the poor. This finding is also found for outpatient care services (Table A4.2 in appendix 4).

Graph 6.1 Non parametric regressions of total health care expenditure, by income



We can also see from this graph that the poor spend less in absolute terms than wealthier individuals, yet the difference is not as pronounced in the private sector (grey lines) compared to the public sector (black lines). We could not explore whether the overall quantity of services received during hospitalisations was the same for poor and non poor individuals, or for users of the public or private sectors. However, total expenditure progressively increases with income in the public sector and hospital fees do not vary much across income groups.

The difference in expenditure must thus either reflect different amount of services received for free or, alternatively, different amount of services received. Given that hospitalisations involve partial or full payment for drugs and diagnostic tests in the majority of cases - even in the public sector - some restriction of services received must happen for the poor. Consumption of health services is limited by ability to pay for services. This is also supported by the shorter duration of stays for the poor found in our study. Further studies are needed to explore this aspect of health care provision in more depth.

These results clearly demonstrate that both fees paid for services provided inside hospitals and those bought from outside the hospitals are relevant in the analysis of economic access to health care in developing countries. This confirms the findings from other analyses detailing the cost of care in public and private facilities (Hotchkiss & Gordillo, 1999; Khan, 2005; Kadir, Khan, Sharudding & Luby, 2000). However we have not found another study detailing this across income groups, sectors of hospitalisation and urban areas in developing countries.

This thesis contributes to the knowledge on access to health care by highlighting the fact that user fees not only impact on access to health care for the poor, but also the cost related to the poor quality - or availability - of services provided in public institutions. This in fact reduces the differences in economic burden provided in public and private institutions and influences the choices of care of both poor and non poor potential users. As distances between living areas and location of health providers are smaller in urban than in rural areas, the non availability of services in the public sector could have a stronger impact in urban areas. However, others have suggested that this phenomenon of bypassing is not restricted to urban areas and occurs as well in rural areas (Atkinson, Ngwengwe &



Macwan'gi, 1999; Pepperall, Garner, Fox-Rushby, Moji & Harpham, 1995; Holdsworth, Garner & Harpham, 1993). Mere availability of public hospitals in cities is not sufficient to provide similar access to health care for the poor. This highlights how access to health care services results from the interaction of availability, costs and other dimensions enabling or hindering utilisation and choices in urban areas of developing countries.

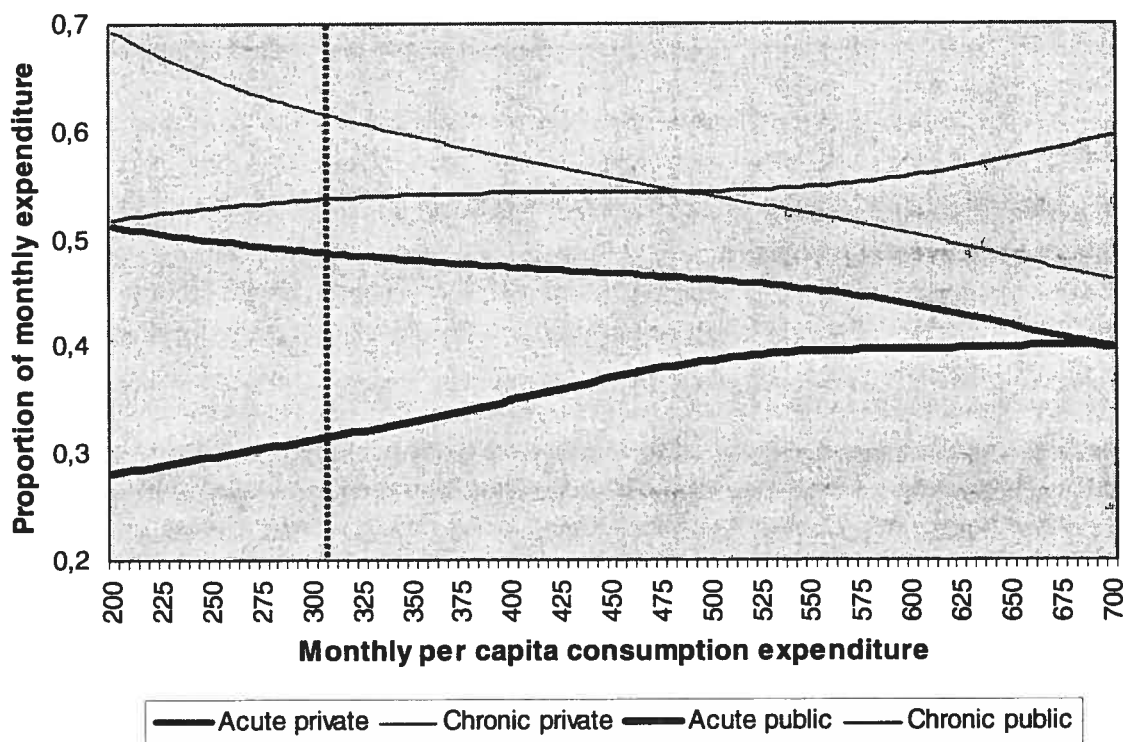
*On catastrophic expenditures and impoverishment*

The proportion of yearly income spent on hospitalisation increases with income in the public sector. In the private sector the poorest individuals pay more in proportion to their income than richer individuals both for acute and chronic illnesses (Graph 6.2). Here again the actual nature of the services received could not be assessed and it is not possible to determine if the quality of services received is similar across sectors and across income groups. In addition, the poor using private institutions could have better capacity to mobilize resources to pay for the care - either through borrowing or selling of assets - compared to the poor going to the public sector. Assuming similar quality of services provided in public and private sectors, this would suggest a significant role for the public sector in promoting equity in Kerala and the need to preserve a functional public care infrastructure in order to offer an affordable option for the poor. However, problems of quality in the public sector have been highlighted and services provided in both sectors could differ.

Private utilisation thus comes at a high cost in urban Kerala. For the same amount of spending, lower income households have to dedicate a bigger portion of their available income on health care, often at the price of falling into - or deeper into - poverty. Choosing a private source of care, or even seeking any care at all, can be out of reach for the very poor if only private options are available or deemed acceptable.

This supports findings from other studies in developing countries (Kawabata, Xu & Carrin, 2002; Gertler & Gruber, 2002; Mehrotra & Jarret, 2002). However, it runs contrary to other analyses suggesting that poor households - through lesser capacity to mobilize funds reducing the amount of health care consumed - spends less as a proportion of their income in Asia (O'Donnell, van Doorslaer, Rannan-Eliya, Somanathan et al, 2005).

Graph 6.2 Non parametric regressions of the proportion of monthly expenditure spent on hospital care, by income



This highlights the need to assess health expenditures as a share of available income more than total income to evaluate the burden of health care for households. In addition, it advocates exhaustive assessments of utilisation, unmet needs for care, sources of care and total health care expenditure to disentangle the effect of reduction in consumption and impoverishing expenditures (Wagstaff & van Doorslaer, 2003). According to a study by the World Bank, Kerala is the Indian state with the lowest proportion of people falling into poverty because of medical costs. Approximately 17% of the population is pushed into poverty annually in Kerala compared to an Indian average of 24% (World Bank, 2001). Although this represents an achievement in Kerala, our analyses suggest that it does not mean that health care does not impoverish households in this state.

In our study, private expenditure is a catastrophic expenditure - defined as health care expenditure amounting to 40% or more of available income (Kawabata, Xu & Carrin, 2002) - in 48% of hospitalisations for casual workers and in 31% of non poor lower income hospitalisations and even of 7% among the wealthy. Catastrophic expenditure decreased

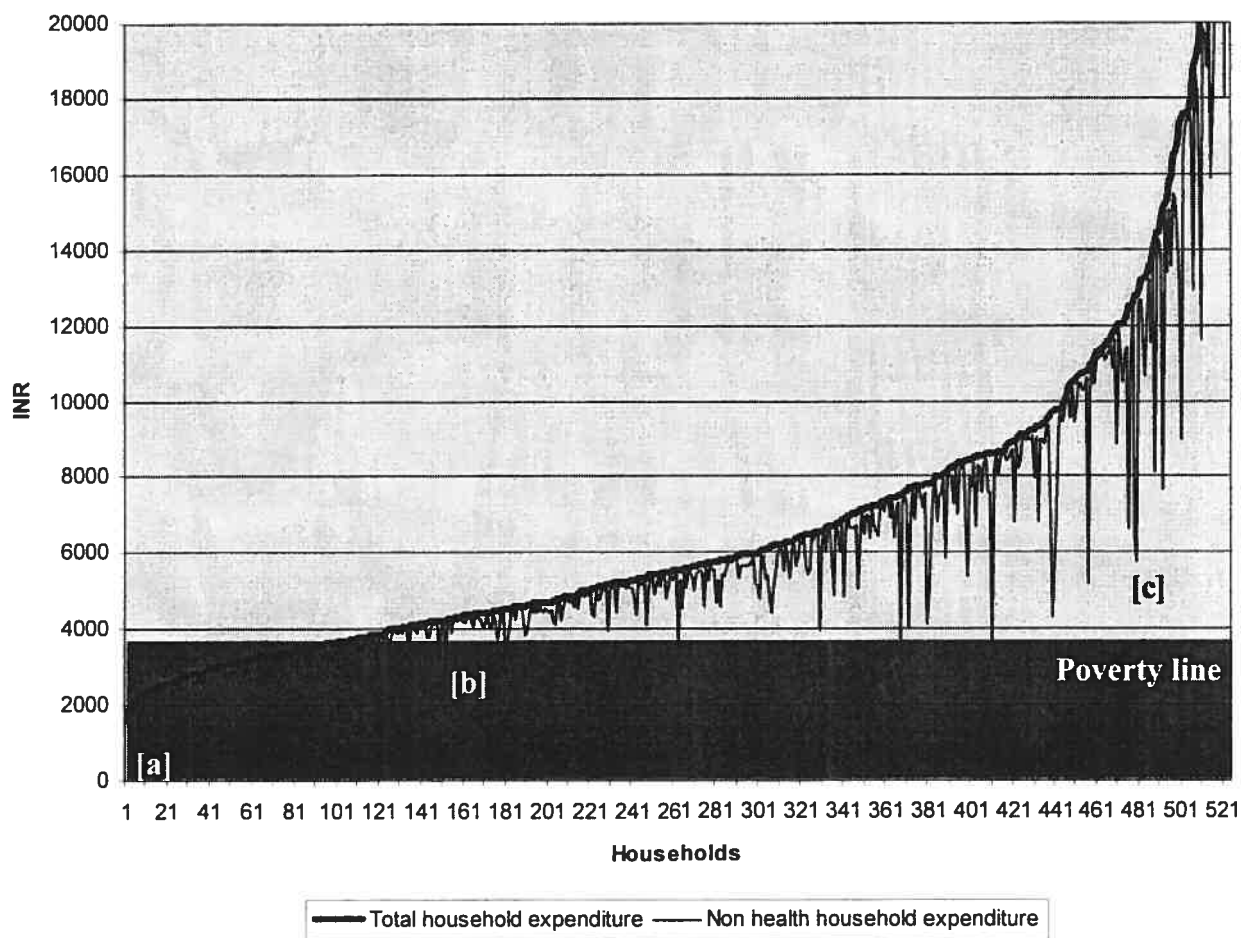
gradually with income in our study in both public and private sectors (data not shown). Hospital expenditure pushes poor households deeper into poverty and some non poor households into poverty.

Graph 6.3 shows the distribution of households ranked in ascending order income (dark line) - as measured by the total household expenditure. The thin line presents post-health expenditure income (non health expenditure) - income from which hospital expenditure was deducted. The shaded area represents levels of expenditure below the poverty line. This graph shows that most poor - such as the individual [a] - are pushed further into poverty by hospital expenditure. In addition, some non poor households are pushed into poverty by the hospital expenditure [b]. This means that less economic resources than the poverty threshold remained available for nutritional requirements and other necessary goods for these households after hospital expenditure. Households are vulnerable to fall into poverty due to hospital expenditure.

This graph further illustrates the fact that hospital expenditures are strongly influenced by ability to pay. It clearly shows the restricted range of expenditure among poorer households and the significant variability among wealthier individuals. Given the fact that the poor consult mostly in public hospitals and the wealthy in private hospitals, we can see that the public sector has a fundamental role to play for poor households and a portion of non poor individuals that could be pushed deeper into poverty by private hospital expenditures. Provided that availability of drugs and services increase, the public sector could play a role in reducing hospitalisation-related impoverishment in urban Kerala.

From this examination of the patterns of utilisation, the processes of care and the economic burden related to hospital care we conclude that there are cumulative barriers to access to health care for poor populations in urban Kerala. The poor and casual workers face barriers to seek care in cases of perceived illness; they turn to the public sector for outpatient and inpatient care needs; and deal with a significant economic impact from their utilisation. The evidence brought so far in this study particularly indicates that affordability of care is reduced for these vulnerable groups in Kerala.

Graph 6.3 Total household expenditure and non health expenditure



*The fourth hypothesis: economic burden of care for chronic illness*

The analyses of the pathways to health care and the utilisation for chronic and acute illnesses also provide some basis for this assertion in our study. Our analysis gives us preliminary evidence that patients hospitalised in private facilities have a higher probability of crossing-over to the public sector for subsequent hospitalisations. While the private might be the first choice, it might prove out of reach for some when long or recurring hospitalisations are required. In addition, the fact that long-term hospitalisation of the wealthy in the public sector (related to chronic ailments of the elderly) represents very high expenditure suggests that the private might prove unaffordable even for the richer segments of the population in urban Kerala. In case of chronic illnesses, wealthier individuals spend more as a proportion of income in the public sector. This is reflected in the segment of the population being hospitalised in paying wards of public institutions. They tend to be

hospitalised longer and have significant health care expenditure during their stay. The public thus remains a source of care - especially for chronic illness-related hospitalisation - and could play a role in preventing impoverishment by reducing the expenditures for these households. This burden related to chronic illnesses - affecting the poor and non poor alike - will increase steadily over the next few decades (Ghaffar, Reddy & Singhi, 2004).

The analysis of the economic burden of care for chronic illnesses is one of the contributions of this thesis to the scientific knowledge on access to health care. Various countries undergoing health transitions - comprising aging populations and emergence of chronic diseases - will face challenges in providing access to health care. The literature clearly suggested that the state of Kerala is at a later stage of transition (cf. indicators in the first part of the literature review). As such, our study can provide insights for countries at less advanced stages of transition. Our analyses question the role of private infrastructure in caring for chronically ill elderly and suggest that the public sector maintain an important role in providing access for chronic care, otherwise unaffordable in the private sectors.

Another study found that severe and chronic illnesses are associated with higher levels of utilisation of public services (Ha, Berman & Larsen, 2002). Our study adds to this knowledge by showing the impact of private utilisation in cases of hospitalisation for chronic illnesses. Private institutions in developing countries could be unaffordable for a large share of the population to care for chronic ailments. This could effectively either push households into poverty or hinder their access to health care, or pull them back to utilising public institutions. Whereas this is seen as an opportunity (giving back a role to public systems) or a threath (overwhelming limited public sector capacity) is a matter of policy and designing proper programmes in the future.

#### **6.4 Looking back and looking ahead**

In this discussion, we have highlighted and cautioned the reader about some limits of the present study. In this section, we would like to raise other limits - and strengths - that need to be taken into consideration in drawing conclusions from this work. In addition, we will

conclude this section by suggesting further areas of research and push for an agenda of research on access to health care and health systems in urban areas of developing countries.

### *Some limits of the analyses*

As in all studies on access to health care, one of the challenges we dealt with during the course of this study lay in the operationalisation and the measurement of access to health care. Access to health care - conceptualised as an opportunity to obtain care - is not measurable directly. Availability, prices and types of services can be measured across areas - although not always easily - and linked to utilisation information to provide evidence for inferring about access to health care.

We used secondary data from a population-based survey. Our analysis represents the first assessment of access to health care in urban Kerala using this database. The use of secondary data proved a challenge. The national sample survey on health care used as principal source of data for this work is a recognised source of information in the Indian context. It is a well-established organisation with experience conducting eleven surveys on health and health care. However, despite all the care invested by NSS in conducting the survey, some observations regarding the quality of the data analysed can be made.

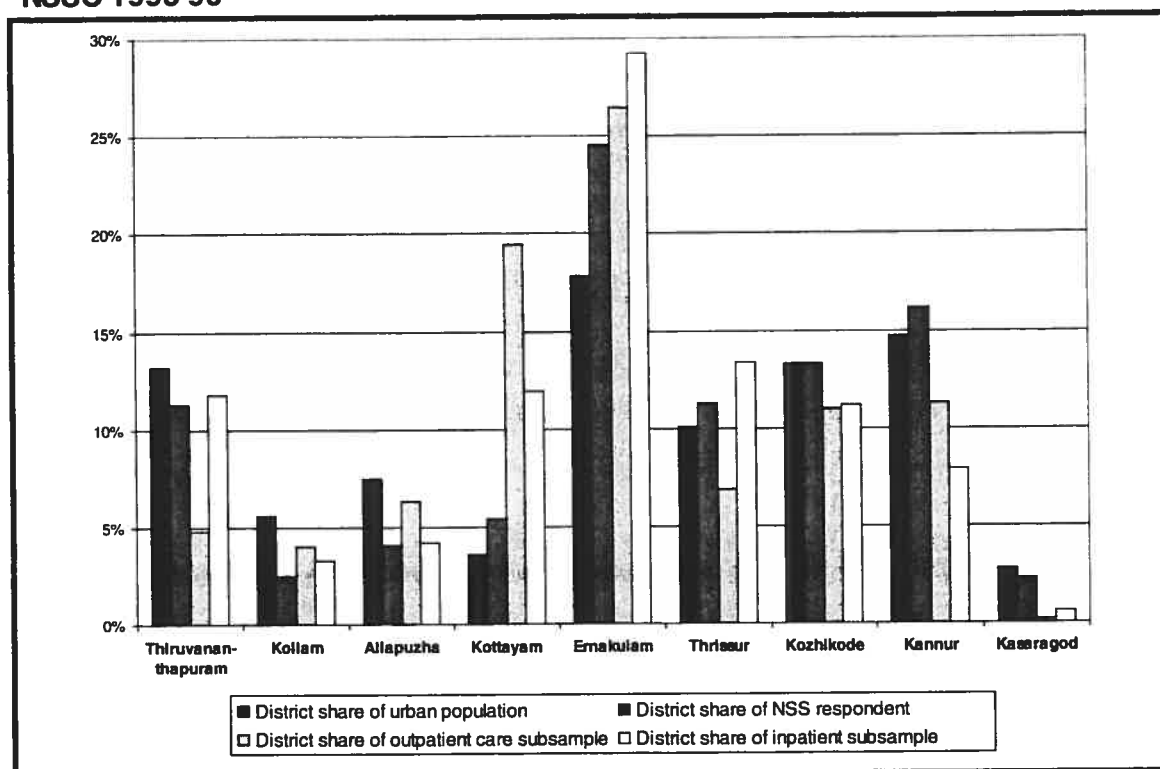
As in any retrospective surveys, the quality of the data is highly dependant on the capacity of respondents to accurately recall information alongwith their willingness to do so. We have seen in the methods section of this thesis that 2.6% of randomly selected households had to be replaced - mostly for the reasons that they were not available for interview at time of survey - and up to 6% of household informants were evaluated as cooperative, but not able to respond. Inaccurate responses could introduce bias in some estimates. However, these proportions remain very low compared to the same survey for other Indian states. We also noted that people from certain districts were evaluated as unable to respond appropriately in higher proportions compared to other districts. Therefore caution needs to be taken before interpreting the results on a city by city basis. In this thesis, we have focused mostly on analysing the generic characteristics of urban areas and their association with varying patterns of utilisation and expenditures.

In addition, survey data is subject to sampling error, a measure of variability among all possible samples. For urban Kerala, our sample was of more than 2000 households and 10000 individuals surveyed. This number is large and provides sufficient statistical power for analysis of frequent events. However, we have seen in the analyses that when looking at episode of illnesses in the last 15 days and at hospitalisations in the last 365 days, sample size falls quickly. This situation was amplified for outpatient care because of the exclusion of censored episodes. As discussed below, this called for the utilisation of resampling methods to provide robust estimates.

NSS data follows a complex stratified sampling design. Such design is aimed at assuring a representative sample across various urban strata. In this study, the sampling process departed slightly from the population distribution in Kerala. In fact, graph 6.4 shows the districts' share of the State's urban population, the share of NSS 52<sup>nd</sup> round urban sample, and the share of outpatient and inpatient care subsamples. From this figure, we can see that some districts (such as Ernakulam, Thrissur, Kottayam and Kannur) were oversampled in the NSS survey while others are under-represented (Thiruvananthapuram, Kollam, Allapuzha and Kasaragod). Looking at the outpatient and inpatient care subsamples, the situation is even more skewed towards these districts. As an example, Ernakulam's urban population represents around 18% of Kerala's urban population, but this district accounts for nearly 25% of the NSS urban sample and concentrates as much as 27% of outpatient and 29% of the inpatient care subsample. This situation probably reflects variations in the patterns of reported illnesses and utilisation between districts as well as coming from the stratified sampling which seems to have favoured districts with larger cities.

The fact that this survey is not designed for providing specific contextual measures in urban areas brought about challenges. We had to link information coming from different surveys to the NSS survey - which proved at times to be a complex task - in order to address our study questions. Future rounds of NSS surveys should include the collection of information about surveyed urban areas in their canvassing. Currently, this type of information - such as availability of health infrastructure and sanitation - is only gathered in rural samples in NSS surveys. Our study's integration of Census data and surveys of health facilities - through the identification of urban units - enabled us to draw insights about the influence of supply on access.

**Graph 6.4 Districts' shares of urban population, NSS sample and sub-samples, NSSO 1995-96**



Further studies would benefit from more precise measures of availability of health services and information related to the actual health care organisations utilised by people. This would provide more information to assess, in more details, the organisational and quality of care aspects of access to health care in urban areas. Description of organisations in both the private and public sectors - with regards models of organisation and management, and to availability of services, quality and acceptability for patients - are needed to better understand the implications of barriers and segmentation of health care sectors that we found in Kerala.

Because of these limitations in the available data, our analyses could not differentiate between the not-for-profit and for-profit private sectors in Kerala. These could present differing organisational characteristics and affordability and thus present potential users with different opportunities to access care. The not-for-profit sector might resemble the public sector to some extent, and the private for-profit sector on other aspects. However, estimates suggest that the not-for-profit sector accounts for only around 5% of all health



care services in India (Berman, 2001). This could have generated a small bias in our analyses, possibly by reducing differences between public and private providers.

In addition, the sole information pertaining to quality of care available in the NSS survey related to reasons for using private providers. No information on the reasons declared for utilising public providers was available. This limited the conclusions we could draw from this analysis. There might be specific aspects of quality in both sectors influencing access to health care and future NSS surveys should include a more precise assessment of perceived quality of care - both as *ex ante* reasons for choosing a source of care and as *post hoc* evaluation of services actually received during the episode - in both sectors.

Another limit related to the lack in information about the services utilized lies in the presence of private practice in public sector institutions. This phenomenon of *private in public* - whereby a provider in the public sector provides, in parallel or sequential manner, services in the private sector - could have biased the results (Kumaran & Suseela, 1989; Mehrotra & Jarret, 2002). The most probable effect of this bias could be the overestimation of expenditures provided in the public sector since some of the services could, in reality, have been utilised in private institutions. However, our analysis suggests very low levels of concurrent public and private utilisation during episodes of illness. Yet, we cannot assess the extent of this bias in our study.

In addition, there is a level of ambiguity with which morbidity data is collected in NSS surveys. In the 52<sup>nd</sup> round used for this analysis, morbidity was qualified by principal biological systems (e.g. urinary tract problems, neurological illness) and by duration of ailment (less than 30 days being qualified as acute and over 30 days being qualified as chronic). Such a classification had the advantage of making reporting illnesses easier for households and individuals, as no precise diagnostics had to be reported. However, it virtually excluded any types of assessment of prevalence of illness and restricted our possible treatment of the data to creating two variables. The first variable described the acute or chronic nature of the health problem and the second variable categorised the ailments into five broad diagnostic categories. The fact that we did find associations between these illness type variables and utilisation and expenditures on health care suggests that more precise measurement of morbidity would provide better assessment of the role of

health status on influencing access to health care - in interaction with other determinants of access. Our analyses could not go deeper into this aspect, and they controlled partially for the impact of severity on access to health care.

We did however use available information related to severity of illness - such as number of days restricted to bed for outpatient care episodes and length of stay for hospitalisation - in our multiple analyses. These indicators are also influenced by other aspects related to characteristics of household and health care. For instance, length of stay is not only influenced by the severity of ailment, but by other factors related to quality of care, ability to pay for hospitalisation, and presence of social support enabling the person to be discharged from hospital. Despite these limitations, the analyses performed in this thesis compare favourably with other studies available from our review of the literature where severity of illness is often not mentioned or accounted for in explanatory models.

Our analysis of health care expenditure focused mostly on hospital expenditure. Limitations in the data available prevented us from using outpatient care expenditure in the manner we have analysed hospital expenditure. This comes from the differences in recall periods. Outpatient care utilisation was assessed here with a two-week recall period. Only the expenditure related to the last 14 days was available and we could not evaluate the annual expenditure on outpatient care from this data-set. Outpatient care expenditure has been shown to be high in Kerala and represent a significant part of total household expenditure for health (Thomas, 2005). However, our focus on hospital expenditure shows that hospitalisation episodes can be significant economic shocks for households. The real extent of economic burden - and disparities - is probably underestimated in our study.

A further limit of our health care expenditure analysis lies in the long recall period for hospitalisation episodes and the difficulty in categorising health expenditure for households. The first aspects points to difficulties in recollecting expenditures in the case of hospitalisation happening during the beginning of the recall period (365 days) compared to more recent hospitalisations. It is possible that both the level of expenditure and the categorisation according to various types of expenditure are more accurate in cases of recent hospitalisations. This problem is inherent to the analysis of relatively rare events at the population level - such as hospitalisations - which require long recall period in surveys.

Finally, a limitation of our analyses is the fact that the data is already a decade old; the survey on health care is carried only every ten years and NSSO releases the data only a few years after data collection. For this dataset, the data became available in 2001. The extent to which the findings from this survey still hold true today remains a matter of conjecture. However, the recent publication of the descriptive statistics from the last survey on health care (a half-round completed exceptionally in 2004) suggest that the trend of increasing private utilisation and increasing health expenditure is confirmed in urban Kerala (NSSO, 2006). Our analyses may have underestimated the true level of economic burden and the barriers to access for the poor. Future analyses of the unit-level data of NSS survey on health care (60<sup>th</sup> round) will enable the research community to assess the progression of the associations found in this thesis.

#### *Some strengths of the analyses*

We believe that our analyses also benefit from significant strengths. This thesis provides the first multilevel assessment of health care utilisation in the Indian context. This method is increasingly used in studies where lower level units are nested into higher level units because of sampling design, or because of naturally occurring clustering. Using this methodology, our study contributes to understanding of the effect of living in specific areas in addition to individual characteristics. Combining such individual and contextual level information in the study of utilisation can generate knowledge about access to health care.

A further strength is that the sampling strategy employed in NSS data provides a representative sample of the urban population. All analyses were weighted to correct for the non-equality of probability of being sampled emerging from the clustered sampling. We have taken into account the design effect - generated by the survey design - through the use of bootstrapping and Markov-Chain Monte-Carlo techniques. The use of such methods provides robust estimators. This increases our confidence in the generalisability of the results to urban Kerala.

We have used a recognised poverty line to identify poor households and have taken into account household size and composition in the measurement of economic status. This

enables us to distinguish between moderately poor and very poor individuals. Using household consumption as a proxy of economic condition is often seen as the appropriate measure of household economic status in developing countries (Deaton, 2003).

In addition, censored episodes were excluded from our analyses to provide better estimates of occurrence and circumvent problems linked with unfinished episodes of illness. This is especially crucial in the analysis of processes occurring during episodes of health care. However, as previously stated, this involved a reduction in sample size and in statistical power to detect differences.

Perhaps the biggest strength of this work lies in the assembly of data related to characteristics of persons, households and urban environments, the reported morbidity, utilisation or non-utilisation of health care services, the choices of source of care and reasons for doing so, and the economic burden related to health care. We have not found in the literature a similar assessment for other urban context of developing countries.

#### *An agenda for research*

Four observations - pertaining to research on access to health care in urban south India and other developing countries - need to be raised. The first observation relates to the need to develop more specific measures of urban areas that can be integrated in population surveys. This would increase the usefulness of these surveys - often under-used by the research community - and contribute to further understand the role of context in enabling or hindering access to health care in urban Kerala. In doing so, the case of medium towns and poorer urban areas should receive a special attention. The presence of significant variations in utilisation across urban units with varying contextual characteristics supports further studies addressing more specific attributes of urbanity and their influence on access.

The second observation relates to the specific situation of casual workers with regards to access to health care and the specific barriers they face in urban Kerala. Our study could partially assess the link of this occupational category with poverty and their joint association with reduced opportunity to obtain care in urban Kerala. Qualitative methodologies and quantitative studies aiming at characterising their access to health care

would provide further information on this issue. Urban poverty might work through complex ramifications of social disadvantages - more than just the physical aspects of urbanity - (Stephens, 1995). Future studies could contribute to the field by assessing the impact of such networks in access to health care in urban areas.

The third observation relates to the need to better understand the influence of chronic illnesses and aging on access to health care. Our study suggests that long-term illnesses and health problems related to old-age will bring specific barriers to health care. Furthering this understanding of access to health for the chronically ill and the elderly could better streamline health care services for these populations, which will represent an increasing burden in urban Kerala and other Indian states.

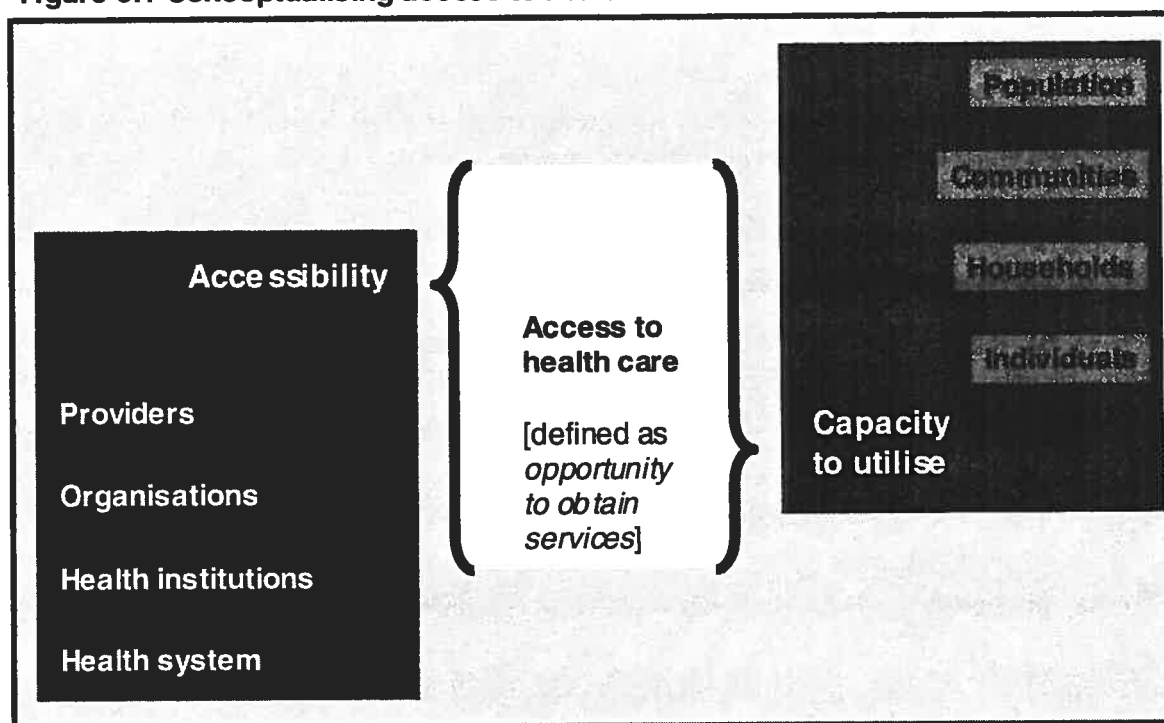
The fourth observation considers the need for more organisational research in the urban context. Macro descriptions of urban health systems have limitations and the knowledge about the impact of specific models of organisation on access to health care in developing countries is lacking. This is especially true for ambulatory care (Berman, 2000). Studies in developing countries have been attentive to the organisation and financing of hospital care. Micro level research using quantitative and qualitative methodologies aiming at describing primary health care organisations in urban areas would contribute to better understanding access to health care in a comprehensive way.

## **6.5 Some thoughts on the concept of access to health care**

Throughout this study, the conceptualisation of access to health care adopted at the outset evolved, in parallel with the development of the analyses and discussions in the literature about contextual determinants of access to health care. Although the conceptual framework adopted at the start proved essential to guide the analysis of a complex issue and dataset, our comprehension of the conceptualisation of access has progressed. In this section, we would like to share some thoughts about the evolution of the framework and outline some ideas for the development of a reviewed conceptualisation of access to health care.

The conceptual framework outlined at the start of this study had four dimensions of access to health care. Various potential determinants of access to health care - pertaining to populations, urban contexts and health systems - were identified. We defined access to health care as opportunity to obtain health care services. Access to health care is therefore determined by the accessibility of services and the ability of persons to utilise not just one or the other. Barriers and facilitators to access to health care can thus be measured from providers and organisations as well as individuals and households. Figure 6.1 illustrates this position.

**Figure 6.1 Conceptualising access to health care**



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This conceptualisation - not fully defined and clarified at the start of this study - proved in line with our findings and useful in the interpretation of results. The operational mix of individual, household, and contextual characteristics - analysed as part of this study - generated the idea that, for each aspects of the accessibility of health services existed a related ability to use of persons, households, communities and populations. Poverty and other characteristics of deprivation - in relation to current prices of services - strongly influence ability to pay for services. Area of residence - depending on the availability of hospital beds in the area - and the transportation capacity of people can influence ability to

reach services. Although this was not found in our study, the interest we placed in social position - such as gender and caste - in determining access to health care suggests that there is also a related ability to seek health care. In fact, in many contexts of developing countries, females have restricted access to health care because it is not acceptable for them to seek care.

Finally, our discussion of quality in various sectors of care, and the strong relationship we have found between consumption of services and ability to pay, generated the idea that restriction in access to health care - and the actual options available to persons - could determine the extent with which people can actually change the course of their illnesses. Having access to services of poor quality or restricting their actual consumption - through shortening durations of hospital stays or the length of drug regimens - can reduce this ability to benefit from accessible services.

Based on these observations, we thus suggest four dimensions of people's capacity to utilize health services (some of them already suggested in the literature) corresponding to dimensions of access to health care: 1) ability to seek; 2) ability to reach; 3) ability to pay; 4) and ability to benefit from health care.

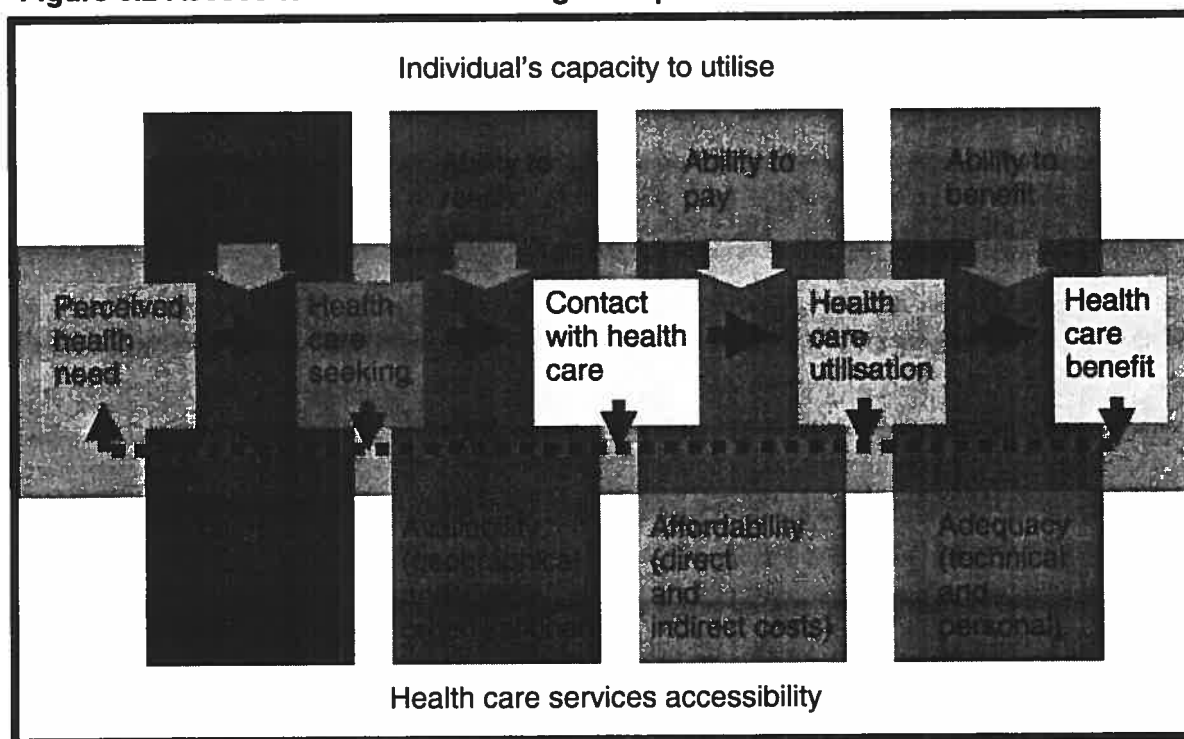
**Ability to seek** health care relates to the concepts of personal autonomy, knowledge about health needs and individual rights that would determine the first step of identifying need for care and expressing the intention to obtain health care. Female discrimination regarding the initiation of care or abuse and neglect discouraging ethnic minorities to seek care would be example. **Ability to reach** health care would relate to the notion of personal mobility, occupational flexibility, and knowledge about health services that would enable one person to physically reach service providers. Restricted mobility of the aged and handicapped, or impossibility for casual workers to be absent from work to go to medical providers would be example of these.

**Ability to pay** for health care is well-known in the health services and health economics literature (Yoder, 1989). It describes the capacity to generate economic resources - through income, savings, borrowing or loans - to pay for health care services. Poverty, social isolation, or indebtedness would be example of factors restricting the capacity of people to

pay for needed care. Finally, **ability to benefit** from health care would relate to the concepts of appropriateness of, and adherence to treatments. Utilisation of health care generating inadequate treatments or not taken in an appropriate manner, would not generate any good for the health of the individual.

These four dimensions of accessibility of services and four abilities of potential users are embedded in the process of utilising health care and relate to causes and consequences of interacting with health providers and utilising services. They thus represent facilitators or barriers to access to health care at various stages of an episode of care - as shown in figure 6.2. Barriers or enablers can occur in a cumulative manner, from initiation of the health care seeking process to the actual benefit from available options for care.

**Figure 6.2 Access to health care through an episode of illness**



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In this study, such cumulative barriers to access were found for the poor - especially the very poor. The fact that they report lower levels of morbidity than wealthier inhabitants yet present more severe ailments either suggests that their circumstances reduce their capacity to identify health care needs and ability to seek care or that they wait longer to utilise and seek care at more progressive stages of illness. In addition, they tend to live in poorer areas

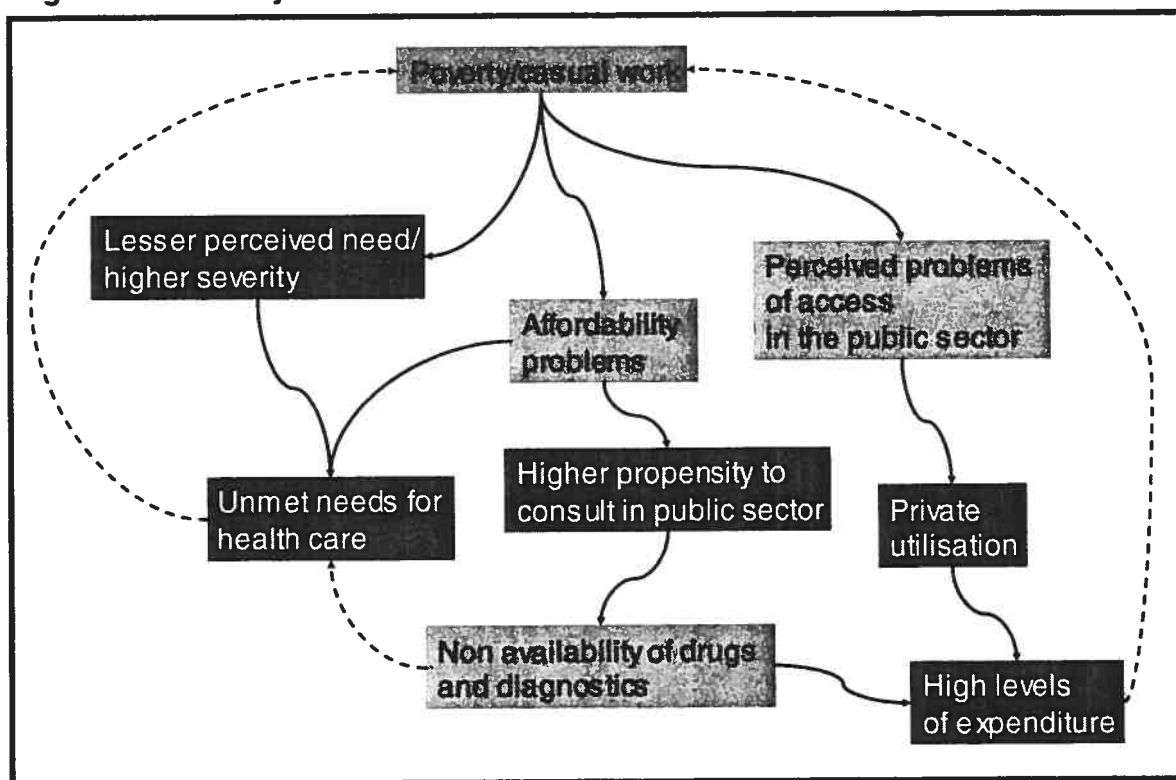


and areas with lower density of hospital beds. This reduces their access to outpatient care services and a reduced ability to reach health care services.

The poor face a higher economic burden of hospital care in Kerala and complementary information suggests that it is also the case for outpatient care services. This is probably their most significant barrier to access to health care: they have lower ability to pay for health services and episodes of illness further reduce their economic power by entailing health care expenditure. Finally, the poor have less choice between sources of care and concentrate in a public sector known to suffer from problems of quality. This can have obvious consequences on their ability to benefit from health care. Access to health care is thus a potential that expresses itself at various stages of the health care seeking process.

The information provided in this thesis suggests that barriers to access for the poor occur at various stages of the seeking process in a web of associations. Figure 6.3 roughly summarizes such relationships based on our empirical findings in the case of access to health care for the poor. Obviously much more complex relationships might occur in reality. However, this figure is highlighting the related nature of barriers to access health care for the poor. Elements related to availability (e.g. drugs), affordability (e.g. costs of care and ability to pay), and adequacy of health care (e.g. perceived quality of care) intermesh to modulate individuals' health seeking behaviour and health resources accessed. This proposal of conceptualisation advocates a design of studies assessing both structural and procedural aspects related to access to health care so as to better grasp the complexity of this concept.

**Figure 6.3. Poverty and barriers to access**



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Based on the various analyses conducted - in conjunction with the extensive literature review on the subject - we suggest that the concept of access to health care results from the interface of individuals, households and populations (with their own abilities) with providers, institutions and systems (with their own level of accessibility). Future studies could expand on this reflection to refine our capacities to analyse access to health care.

## 7 CONCLUSION

Kerala is a unique demographic, social and political context. A model of development of good health at low cost, it is now facing the challenges of an aging population, the emergence of chronic diseases and a health-conscious population (Bhutta, Nundy & Abbasi, 2004). Ensuring access to care for the poorest and providing them opportunity to access quality care demands a reassessment of public primary care infrastructure in urban areas and mechanisms to reduce the economic burden linked with utilisation of health services, especially in the private sector. Kerala, as well as other Indian states, face planning and allocation decisions in order to meet the health needs of urban poor. Kerala can again be a source of knowledge for other states and countries entering similar phases of development.

This study has produced a number of implications for policy. We conclude by suggesting some of these possible policy orientations for Kerala, and other States at similar levels of development and health transitions. These have emerged from the analysis. As this thesis did not focus on policy content analysis or other analytic designs aiming at understanding health policy, they merely represent our effort to contribute to discussions and debates about health care policy in the context of Kerala state, India and other developing countries.

### *Strengthening the urban primary care infrastructure*

The first implication from our study is that investments should be made to strengthen the public sector's primary care infrastructure in urban Kerala. Primary health centres - the basic public care infrastructure in rural areas - are virtually absent in urban areas. Investing in first-contact institutions in the public sector could prove a key element to reach the poor and this investment could be targeted at areas of relative urban poverty and those associated with lower density of public beds. This study suggests that medium might be a possible target of such investments. The development of first-contact care institutions have been advocated in order to develop more coherent health care systems in urban areas of developing countries, where the concentration of hospitals and specialised clinics have not served the urban poor (Harpham, Vaughn & Rifkin, 1985).

This is also supported by our finding that hospitals are often the first-contact with the health system. Increasing the availability and quality of public outpatient care could promote the use of these facilities. However, such high levels of self-referral to hospitals have been found before in developing world cities, even where primary health centres are available, and hospitals are often identified as the first choice for care for many (Holdsworth, Garner & Harpham, 1993). Strengthening primary health care in urban areas might fulfill unmet needs for care more than actually reducing the burden imposed on outpatient care units of hospitals (Atkinson, Ngwengwe & Macwan'gi, 1999). With this regard, the creation of intermediate tier of advanced health centres between hospitals and health centres - or reference centres - has been suggested (Pepperall, Garner, Fox-Rushby, Moji & Harpham, 1995; Holdsworth, Garner & Harpham, 1993; Briggs, Capdegelle & Garner, 2001). Challenges to promote the utilisation of public sector primary care institutions remain, especially when other more sophisticated infrastructure are available.

In addition, we found that 80% of users turn to the private sector for outpatient care. The reasons given for doing so relate to the lack of availability of services and poor quality of services in public institutions. The segmentation of public and private markets - people seeking private outpatient care are hospitalised in the private sector - seems to warrant promotion of public outpatient care utilisation among the poor to prevent costly private outpatient and inpatient care.

Investments have to be made to increase the attractiveness of available public health care institutions in urban areas, in order to improve access for those with limited access to health care. This might not involve the building of new infrastructure but the reorganisation of existing ones and improvements in availability and quality of services to make them a real option for first-contact care and entry into the health system (NoorAli, Luby & Rhabhar, 1999; Abel-Smith, 1989). This improvement in provision of ambulatory care services is seen as one of significant contributions to the performance of health systems (Berman, 2000). The provision of preventive and curative services on an ambulatory basis has the potential to contribute the largest immediate gains in health status in populations, especially for the poor. However, the organization of ambulatory care in both public and private infrastructures remains poorly understood and should be the object of more scrutiny with regards to health policies and programmes (Berman, 2000).

*Ensuring availability of public services*

The second set of implications from our analyses comes from the fact that the public sector plays a crucial role in Kerala in providing access to health care for the urban poor and casual workers. The public sector has been shown to be of poor quality and many hospitals and primary health care centres suffer from a lack of medical supplies. This is clear from our analysis of medical expenditure showing that hospitalisations in the public sector involve buying medical supplies and medications from outside the hospital. The poor and casual workers have lower access to care for perceived illness - despite more severity - they turn more to the public sector and are subject to high expenditure in both sectors. The poor experience catastrophic expenditure and are further impoverished by health care. Reinvestment in the public sector to insure availability of drugs and supplies is necessary to guarantee access to health care for the poor. Mere availability of public infrastructure does not suffice to provide adequate level of access to health care. Increased availability of drugs and diagnostics in the public sector should help reduce the expenditure related to public hospitalisation.

This seems especially relevant regarding the emergence of chronic diseases in Kerala. Our analyses suggest that the public sector has a role to play with regards to chronic illnesses, and this even among non poor individuals. Increasing the level of care available in public institutions could promote utilisation of these services by both poor and non poor individuals for ailments necessitating continuous medical services and long-term hospitalisations. This seems especially true since quality-related reasons justified utilisation of private source of care among non poor in our study.

This study points to the need for continuing improvement and development of public health systems in urban areas of developing countries as a way to ensure equity. Relying solely on the private sector's development to respond to growing chronic disease health care needs might not prove an equitable option. Our study emphasizes the need to consolidate the public sector's capacity to address the poorest and most vulnerable's health needs and make sure that it represents a real option for obtaining quality health care at a reasonable cost.

However, the current level of public investments in health in India is far from the suggested benchmark of 5% of GNP invested in health (Abel-Smith, 1989). Reinvestments in the public sector, to increase the availability and quality of services, could be crucial to prevent impoverishing expenditure borne in the public sector. An integrated approach needs to be taken to reduce fees charged to the poor and reduce expenditures incurred, for lack of availability of services in the public sector. This could arise through integrated interventions including increases in budgetary allocation, strengthening of management capacities to maximise the benefits from alternative financing mechanisms, and the replacement of user fees by other revenue-generating mechanisms (James, Hanson, McPake, Balabanova, Gwatkin, Hopwood et al., 2006). However, there does not seem to be any simple solutions in pluralist contexts such as those of urban health systems.

Furthermore, increasing the quality of services in public institutions could also promote utilisation from non poor households - which are also subject to impoverishment from health care utilisation - and increase the cross-subsidization generated through the collection of user fees (Chisadza, Maponga & Nazerali, 1995). However, these are complex interventions and care should be paid to ensure that increase in quality of services in the public sector does not only benefit the better-off (Dipankar Rao & Peters, 2006). Other studies have shown that targeting poor population is a challenge in developing countries (Gwatkin, 2003; Castro-Leal, Dayton, Demery & Mehra, 2000). The implementation of interventions aiming at improving access to health care and benefits from health care for the poor need to pay attention to the health system as a whole, including its public and various private providers and institutions.

### *Engaging the private sector*

This study confirmed the important role of the private sector in the provision of health care services, even among the poor, in urban Kerala. We also showed that, despite being more expensive than public health care, private services are the first choice for health care for a majority of the population. This has clear implication for the future since the vast majority of the population is currently served in the private sector, from a variety of different providers with varying levels of qualification.

Various observers have emphasized the important role of private providers in India and other developing countries (Peters, 2002; Berman, 2001; Preker, Carrin, Dror, Jakab, Hsiao & Arhin-Tenkorang, 2002; Palmer, Mueller, Gilson, Mills, Haines, 2004). Given the extent to which the private sector currently serves the health needs of the population, it is imperative to try to increase its impact and reduce the inequalities that its mode of financing can generate. However, different economic groups might access services of varying quality in the private sector for care and more attention should be given to ensure that these services are safe for their users. Observers have highlighted the need to better regulate the private sector's services (Peters, Rao & Fryatt, 2003). More emphasis should be placed on better understanding the private utilisation of various groups before concluding that the current offer of private services fulfills the health needs of most, including the poor.

Some have suggested that governments should engage the private sector contractually for the delivery of public services and through subsidies of services for poor population (Palmer, 2000; Peters, Rao & Fryatt, 2003; Conteh & Hanson, 2003; Preker, Harding & Travis, 2000). Especially in the private not-for-profit sector which is seen as sharing on many aspects with publicly provided services (Berman, 2001). This again advocates for a stronger role for public sectors of oversight and regulation of privately provided services (Peters, 2002). However, the current capacity of governments to regulate the private sector or manage privately provided public health services remains low in India and this would need further scrutiny. Providing answers for this aspect is beyond the scope of this thesis. Our work does emphasize the need to broaden the scope of policy from a *public sector focus* to a *health system focus* in order to better integrate the various elements of the health care system in promoting access to health care in urban areas.

### *Providing financial protection against illness*

Private utilisation is the main source of care in Kerala, even among lower income categories, and this situation will likely continue in the future. This results in out-of-pocket health expenditure being the predominant mode of financing for health care in Kerala, as in the rest of India. Our review has shown insurance coverage to be extremely low in Kerala. Our analysis suggests that accessing public sector care does not fully protect against health

expenditure and potential impoverishment. Out-of-pocket expenditure remains the main mode of financing health care in both public and private sectors and expenditures are high.

The fourth policy implications relate to the provision of financial protection for the poor and - to some extent - the non poor with low income. The latter remain vulnerable to being impoverished by hospitalisations and chronic health care needs. Efforts should be put into developing some form of financial protection for low income populations to cover their health expenditure related to both public and private health care utilisation. This financial protection should cover all services required during hospitalisation including expenditures for services bought from outside the hospitals - due to lack of availability of services. Given that availability of infrastructure is a determinant of access to care - and public sector availability varies across urban areas - providing protection in both public and private sectors could represent the only way to provide effective choices for care for the poor in urban Kerala.

Developing countries have mostly informal economic sectors, which reduces their capacity to generate revenue through taxation. This clearly limits their capacity to provide universal health care coverage for their population. Various studies suggest that private insurance - when appropriately regulated - can provide protection against the economic burden of health care through prepayment and risk-pooling (Sakhri & Savedoff, 2005; Kawabata, Xu & Carrin, 2002; James, Hanson, McPake, Balabanova, Gwatkin, Hopwood et al., 2006; Fabricant et al. 1999). However, these have also been seen as limited in scope for their difficulty in providing protection for those who need it most. The poor are often excluded from private insurance because of inability to contribute financially to the plan and their frequently higher risks of being sick (Palmer, Mueller, Gilson, Mills & Haines, 2004). Regulation of insurance markets is required in order to prevent insurance mechanisms from exacerbating inequalities in access to health care (Evans, Carrin & Evans, 2005; Sekhri & Savedoff, 2005). These regulatory challenges invoke a strong stewardship role for policy makers with respect to insurance institutions (Evans, Carrin & Evans, 2005; Kawabata, Xu & Carrin, 2002; Audibert, Mathonnat & de Roodenbeke, 2004).

Community-based insurance systems have been suggested as providing protection against the costs related to illness in resource-poor settings (Sakhri & Savedoff, 2005; Ranson,



Sinha, Gandhi, Jayswal & Mills, 2006; Preker, Carrin, Dror, Jakab, Hsiao & Arhin-Tenkorang, 2002; Ekman, 2004. These have shown increase in utilisation in case of illness in India (Devadasan, Ranson, van Damme & Criel, 2004). However, they did not protect fully against the cost of care because either required prepayments remained unaffordable for the poorest, or because upfront payment for services is still required before reimbursement (Ranson, Sinha, Gandhi, Jayswal & Mills, 2006). Furthermore, community-based insurance schemes have demonstrated the difficulties in generating cross-subsidization of care for the poor through the explicit targeting of the poor and exclusion of non poor individuals or lack of participation by wealthier individuals (Carrin, Waelkens & Criel, 2005; Ranson, 2002). Despite their role in protecting against catastrophic expenditure (Xu, Evans, Kawabata, Zeramdini et al., 2003), community-based health care plans generally have difficulty to raise sufficient revenues to pay for the health care of their members (Preker & Carrin, 2004). This has prompted observers to suggest that community financing schemes are complementary to other forms of health care financing, including government participation in financing health care (Ekman, 2004; Preker & Carrin, 2004).

Current proposals of health insurance schemes for the poor in Kerala should receive close attention. The extent with which this plan would cover a wide range of expenditure incurred through hospital services provided in both the public and private sectors could serve an important role in Kerala. The fact that the government would subsidize partially the premiums required for participation in the plan could alleviate the aforementioned problems for the poor in affording health insurance. As discussed previously (paper 3), an important issue remains as to whether this plan would cover expenses from outside the hospital during a hospitalisation episode. Our study clearly suggests that this should be the case, since this is where most of the public sector expenditure is incurred. Furthermore, hospitalisations often involve outpatient care consultations before admission and after discharge. Outpatient care is not currently covered by the insurance scheme proposal; yet, it is an important cause of impoverishment in Kerala (Thomas, 2005).

These issues are important in order to prevent a further privatisation of health care in Kerala. The insurance scheme could encourage the demand for private services among the poor in a situation of higher perceived quality of care in the private sector. The

aforementioned policy of increasing availability and quality of services in the public sector remains crucial to maintain or increase the public sector's role.

### *Concluding remarks*

Kerala faces the challenges of health transition and benefits from a public and private infrastructure on which to build its response. Other states might not be in the same situation with regards to level of developments of the public and private sectors, yet will face the challenges of transition in the future, especially in urban areas. Kerala once again is at the forefront and therefore could provide insights in order to better understand such phenomena in other contexts.

The Kerala model of development - based on equalitarian values and grass-roots participatory principles - proved its capacity to promote health among its population. Decentralisation of governance and development of rural areas have been prime focus of policy in Kerala over the last decades. It now faces the challenges of maintaining health and caring for illness among its relatively older and health educated population. With this regard, we have highlighted specific challenges of urban areas. Maybe the time has come to give more thoughts about the situation occurring in cities in Kerala.

Given its strong public health sector and high availability of services in the private sector, there is ground to feel optimistic that Kerala's heritage in development can have an impact on the urban poor. Kerala could be a model of *good urban health at low-cost*. We hope that the effort put into this study can help to develop solutions to these current or emerging barriers and inequalities in access to health care in urban areas.

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# APPENDIX 1 NSS 52<sup>nd</sup> round questionnaire - Schedule 25.0

CENTRAL	
STATE	

GOVERNMENT OF INDIA  
NATIONAL SAMPLE SURVEY ORGANISATION  
SOCIO-ECONOMIC SURVEY

ORIGINAL	
DUPLICATE	

## FIFTYSECOND ROUND

RURAL	
URBAN	

JULY 1995-JUNE 1996  
SCHEDULE 25.0 : SURVEY ON HEALTH CARE

[ 0 ] descriptive identification of sample household	
state/u.t.	hamlet name
district	ward/inv. unit/block**
tehsil/town	charge-circle/EB**
village name	house number
	name of head

\* tick mark ( \ / ) may be put in the appropriate place  
\*\* delete whichever is not applicable

[ 1 ] identification of sample household					
sl. no.	item	code	sl. no.	item	code
1.	sample(central-1, state-2)		11.	sample village/block sl. no.	
2.	sector (rural -1, urban-2)		12.	hamlet-group/sub-block no.	
3.	FOD sub-region		13.	second-stage stratum no.	
4.	round number	5 2	14.	sample household no.	
5.	schedule number	2 5 0	15.	sl.no. of informant (as in block 3) name .....	
6.	state-region		16.	general educational level of informant (code)	
7.	stratum no.		17.	response code	
8.	district code		18.	survey code	
9.	sub-sample		19.	reason for substitution of original household (code)	
10.	sub-round				

- em 16 - general educational level of informant : To be copied from block 3.
- em 17 - response code : informant co-operative and capable-1, informant co-operative but not capable-2, informant busy-3, informant reluctant-4, others-9.
- em 18 - survey code : original h.h. surveyed-1, substituted h.h. surveyed-2, nothing surveyed-3.
- em 19 - reason for substitution of original h.h. : household member not available to provide information-1, unwilling-2, others-9.

Sch. 25.0-2

[ 2 ] household characteristics	
1. household size	14. whether any death during last 365 days (yes-1, no-2)
2. no. of persons (60 +)	15. if 'yes', no. of deaths
3. social group (code)	16. no. of members hospitalised during last 365 days
4. household type (code)	17. no. of members reporting any ailment during last 15 days
5. household monthly consumption expenditure (Rs.)	18. no. of family nuclei
6. per capita monthly consumption exp. (Rs.0.00)	19. each aged couple/person gets separate room (yes-1, no-2)
7. major source of drinking water (code)	20. if 'no' in item 19, no. of aged couples/persons not getting
7.1 whether perennial (yes-1, no-2)	21. whether aware of need for (yes-1, no-2)
7.2 constructed by (code)	21.1 immunisation of children
8. type of structure (code)	21.2 immunisation of pregnant women
9. type of dwelling unit (code)	21.3 iodised salt
10. type of latrine (code)	21.4 ORT for severe diarrhoea
11. type of drainage (code)	22. annual amt. of insurance premium (Rs.)
12. premises sprayed with any insecticide (yes -1, no -2)	22.1 life
13. animal shed in the same premises (code)	22.2 medical
	22.3 accident

sl.
no.
(1)

#NOTE  
CODES col.3

CODES FOR BLOCK-2 :

- item 3 - social group : scheduled tribe-1, scheduled caste-2, others-9. col.6
- item 4 - household type :  
  - for rural areas : self-employed in non-agriculture -1, agricultural labour-2, other labour -3, self-employed in agriculture -4, others -5.
  - for urban areas : self-employed -1, regular wage/salaried -2, casual labour -3, others -9. col.7
- item 7 - major source : tap-1, tube-well/hand pump-2, tankers-3, pucca well-4, tank/pond reserved for drinking-5, river/canal-6, others-9. col.8
- item 7.2- constructed by: Govt.-1, community-2, charitable instn.-3, others-9
- item 8 - type of structure : kutcha -1, semi-pucca -2, pucca -3.
- item 9 - type of dwelling unit : chawl-1, flat-2, independent house-3, others-9
- item 10 - type of latrine: no latrine-1, service latrine-2, septic tank-3, flush system-4, others-9.
- item 11 - type of drainage : no drainage-1, open kutcha-2, open pucca-3, cover pucca-4, underground-5.
- item 13 - animal shed : no animal shed -1, animal shed: attached to the building -2, detached from the building -3.



Sch. 25.0-4

[3.1] particulars of pregnancy(ies) of ever married women of age below 50 years									
sl. no. in bl. 3	age (years)	during last 365 days		total number of					per. still born deliv. (year)
		whether pregnant (yes-1, no-2)	for code 1 in col.3, status of pregnancy (code)	pregnancies	abor-tions	deli-veries	births	survi-ving chil-dren	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

**CODES FOR BLOCK-3.1:**

col.(4)-status of pregnancy : currently pregnant-1, delivered birth- 2, still birth-3, had spontaneous abortion-4, had abortion- 5, had MTP- 6.

[3.2] particulars of deaths in the household during last 365 days										
sl. no.	name of deceased member	sex (male -1, female -2)	age at death (years)	time elapsed since death (code)	cause of death (code)	place of death (code)	medical attention before death (code)	during last 365 days		
								whether hospitalised (yes-1, no-2)	no. of times hospitalised	if pregnant, time of death (code)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
91										
92										
93										

- col. 5 - time elapsed since death : 15 days or less-1, more than 15 days-2.
- col. 6- cause of death: old age -01, disorders of respiratory system -02, diseases of circulatory system -03, causes typical of infancy -04, accidents & injuries -05, fevers -06, digestive disorders -07, disorders of central nervous system -08, other symptoms -09; causes relating to child birth/pregnancy : bleeding-11, sepsis-12, obstructed/prolonged labour-13, convulsions-14, anaemia-15, jaundice-16, heart failure-17, others-19.
- col.7- place of death: at home-1, during transport-2, govt. hospital-3, pvt. hospital-4, others-9.
- col.8- medical attention : institutional : govt. -1, others -2; registered medical practitioner -3, other medical practitioner -4, no medical attention -5.
- col. 11- time of death: during : pregnancy-1, delivery-2, abortion-3; within 6 weeks after delivery/abortion-4, others-9.



[3.3] use of tobacco/intoxicants by members aged 10 years and above

1. sl. no. of member(as in block 3)				
2. sex ( male-1, female-2)				
3. age (years)				
4. whether regularly consuming (yes-1, no-2)				
4.1 alcohol				
4.2 biri/cigar/cigarette/hukka				
4.3 tobacco				
4.4 ganja				
4.5 charas				
4.6 opium				

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CODES FOR BLOCKS 4 and 5.1 :

vered:  
had i: item 5, 12.1 & 13.1 of blk.4 & item 5 of blk.5.1 - type of hospital/ sources of treatment:

- public hospital....1,
- public dispensary...3,
- nursing home ..... 5,
- ESI doctor,AMA etc..7,
- primary health centre.....2,
- private hospital.....4,
- charitable institution run by public trust...6,
- private doctor.....8,
- others.....9.

Item 8 of block 4 - when admitted :

- during last 15 days.....1,
- 16 days to 365 days.....2,
- more than 365 days ago....3.

Item 9 of block 4 - when discharged :

- not yet....1, during last 15 days.....2, 16 days to 365 days.....3.

CODE FOR BLOCK 5:

item 7 - status of ailment :

- started more than 15 days ago : & is continuing -1, & has ended -2;
- started within 15 days : & is continuing -3, & has ended -4.

item 11 - reason :

- Govt. doctor/facility too far.....1, not satisfied with treatment.....2,
- long waiting.....3, lacks personal attention.....4,
- bad treatment.....5, doctor/staff corrupt/charge money...6,
- medicines not available or ineffective if available.....7,
- private doctor more easily available.....8, others...9.

item 12 - reason for no treatment :

- no medical facility available in the neighbourhood.....1,
- facilities available but no treatment sought owing to :
- lack of faith.....2, long waiting.....3,
- financial reasons...4, ailment not considered serious...5. others...7.

item 14 - whom consulted :

- self/ other household member/ friend.....1, medicine shop.....2,
- non-medical professional practitioner.....3, others.....7.

Sch. 25.0-6

[4] particulars of medical treatment received as inpatient of a hospital during last 365 days					
1. sl. no. of the hospitalisation case	1	2	3	4	5
2. sl. no. of member (as in col.1 block 3/3.2) hospitalised*					
3. sex ( male-1, female-2)					
4. age (years)					
5. type of hospital (code)					
6. nature of ailment (code)					
7. type of ward (free-1, paying general-2, paying special-3)					
8. when admitted (code)					
9. when discharged (code)					
10. duration of stay in hospital (days)					
11. details of medical services received (not taken/required -1, taken : free-2, partly free-3, on payment-4)					
11.1 medicine					
11.2 X-ray/ECG/EFG/scan					
11.3 other diagnostic tests					
11.4 surgery					
11.5 any other treatment					
12. whether treatment availed before hospitalisation (yes-1, no-2)					
12.1 if 'yes' in item 12, source of treatment (code)					
12.2 if 'yes' in item 12, duration of treatment (days)					
13. whether treatment continued after discharge from hospital (yes-1, no-2)					
13.1 if 'yes' in item 13, source of treatment (code)					
13.2 if 'yes' in item 13, duration of treatment (days)					

\*NOTE : Sl. no. of a member will be repeated as many times in line no.2 the number of times the member is hospitalised. For hospitalisation of dead members enter 91, 92, etc., as given in col.(1) of Block 3.

Sch. 25.0-7

[4.1] expenses incurred for treatment of members treated as inpatient of hospital during last 365 days and source of finance					
1. sl. no. of the hospitalisation case (as in block 4)	1	2	3	4	5
2. sl. no. of member (as in block 4) hospitalised *					
3. whether any medical service provided free by employer (yes:govt.-1, pvt.-2; no-3)					
4. whether any hospital charges paid (yes-1, no-2)					
5. if 'yes' in item 4, amount paid (Rs.)					
6. total medical expenditure for treatment during the stay at hospital (Rs.)					
7. particulars of other expenses incurred by the household (Rs.)					
7.1 transport (other than ambulance)					
7.2 lodging charges of escort(s)					
7.3 attendant charges					
7.4 personal medical appliances					
7.9 total					
8. whether any loss of household income incurred (yes-1, no-2)					
9. if 'yes' in item 8, amount of loss during last 365 days (Rs.)					
10. particulars of source of finance for meeting the expenses in items 6 & 7.7					
10.1 current income (Rs.)					
10.2 past savings (Rs.)					
10.3 sale of draught animals (Rs.)					
10.4 sale of ornaments (Rs.)					
10.5 sale of other physical assets (Rs.)					
10.6 borrowings (Rs.)					
10.7 reimbursement by employer (Rs.)					
10.8 if any amount reimbursed, type of employer (Govt.-1, private-2)					
10.9 other sources (Rs.)					

NOTE : Sl. no. of hospitalisation case and sl. no. of member will be repeated in line no. 1 & 2 exactly as in block 4.

Sch.25.0-8

[5] particulars of spells of ailment of household members during last 15					
1. sl. no. of spell of ailment	1	2	3	4	
2* sl. no. of member (as in col.(1) of block 3/3.2) with ailment					
3. sex ( male-1, female-2)					
4. age (years)					
5. number of days within the reference period					
5.1 ill					
5.2 on restricted activity					
5.3 confined to bed					
6. nature of ailment (code)					
7. status of ailment (code)					
8. whether treated (yes-1, no-2)					
if 'yes' in item 8, no. of days of treatment					
8.1 recommended					
8.2 taken					
8.3 taken within the reference period					
if 'yes' in item 8, fill in items 9 to 11, for the period of ailment, not treated as inpatient of hospital; otherwise skip to item 12					
9. no. of sources of treatment					
10. whether any treatment received from non-govt. sources (yes-1, no-2)					
11. if 'yes' in item 10, reason (code)					
if 'no' in item 8, fill in rest of the block; otherwise skip to item 12					
12. reason for no treatment (code)					
13. whether any other measure taken for recovery/relief (yes-1, no-2)					
14. if 'yes' in item 13, whom consulted (code)					
15. if 'yes' in item 13, expnd. incurred (Rs)					
16. loss of household income (Rs.)					

\*NOTE : Sl. no. of a member will be repeated as many times in line no. 2 as the number of spells of ailment reported by the member. For dead members enter 91, 92, etc., as given in col.(1) of Block 3.2.

Sch.25.0-

[5.1] expenses incurred during last 15 days for treatment of members (not as inpatient of hospital) and source of finance

1. sl. no. of treatment	1	2	3	4	5
2. sl. no. of spell (as in block 5)					
3. sl. no. of ailing member (as in block 5)					
4. whether any medical service provided free by employer (yes: Govt.-1, pvt.-2; no-3)					
5. source of treatment (code)					
6. details of medical services received (not taken/required-1, taken: free-2, partly free-3, on payment-4)					
6.1 medicine received					
6.2 X-ray/ECG/EEG/scan					
6.3 other diagnostic tests					
6.4 surgery					
6.5 any other treatment					
7. total medical expenditure for treatment by the household (Rs.)					
8. particulars of other expenses incurred by the household for treatment (Rs.)					
8.1 transport & lodging charges					
8.2 personal medical appliances					
8.3 others					
8.9 total					
9. particulars of source of finance for meeting the expenses in items 7 & 8.					
9.1 current income (Rs.)					
9.2 past savings (Rs.)					
9.3 sale of draught animals (Rs.)					
9.4 sale of ornaments (Rs.)					
9.5 sale of other physical assets (Rs.)					
9.6 borrowings (Rs.)					
9.7 reimbursement by employer (Rs.)					
9.8 if any amount reimbursed, type of employer (Govt.-1, private-2)					
9.9 other sources (Rs.)					

NOTE : Sl. no. of a spell and sl. no. of a member will be repeated as per line nos. 2 and 3 as the number of sources of treatment reported for the spell.

as For 2.

Sch.25.0-10

CODES FOR NATURE OF AILMENT (item 6 of blocks 4 & 5)

diarrhoea & gastro-enteritis dysentery (including cholera)	101	acute disease of ear ...	111
tetanus ... ..	102	heart failure ... ..	112
diphtheria... ..	103	cerebral stroke ... ..	113
whooping cough... ..	104	cough and acute bronchitis.	114
meningitis & viral ... .. encephalitis	105	acute respiratory infection (including pneumonia)	115
fevers of short duration... ..	106	diseases of mouth, teeth... & gum	116
chicken pox ... ..	107	disease relating to pregnancy & child birth (incid. natural abortion)	117
measles/German measles ... ..	108	injury due to accident ... .. and violence	118
mumps ... ..	109	other diagnosed ailment ... .. (of less than 30 days)	119
diseases of eye ... ..	110	undiagnosed ailment ... .. (of less than 30 days)	120
chronic amoebiasis ... ..	201	cataract ... ..	220
pulmonary tuberculosis ... ..	202	other diseases of the eye..	221
leprosy ... ..	203	hearing disability ... ..	222
sexually transmitted diseases	204	other diseases of the ear..	223
jaundice ... ..	205	diseases of heart ... ..	224
guinea worm ... ..	206	high/low blood pressure ... ..	225
filaria (elephantiasis) ... ..	207	piles ... ..	226
cancer ... ..	208	speech disability ... ..	227
other tumours ... ..	209	diseases of mouth, teeth... and gum	228
(general debility) anaemia.	210	gastritis hyper-acidity/ ... .. gastric/peptic/duodenal ulcer	229
goitre & thyroid disorders.	211	diseases of kidney/urinary.. system	230
diabetes ... ..	212	prostrate disorders ... ..	231
beri beri... ..	213	hydrocele ... ..	232
ricket ... ..	214	pain in the joints ... ..	233
other malnutrition diseases	215	other disorders of bones ... .. and joints	234
mental & behavioural disorders	216	locomotor disability... ..	235
epilepsy ... ..	217	other congenital deformities (excluding disability)	236
other disease of nerves ... ..	218	other diagnosed diseases (of more than 30 days)	237
visual disabilities... ..	219	undiagnosed ailment (of more than 30 days)	238
(other than cataract)			

## APENDIX 2 Description of questionnaire items

Table A2.1 Operational definition of household level variables

<b>Item name</b>	<b>Item definition and description</b>
<b>Household</b>	<p>A group of persons normally living together and taking food from a common kitchen. The members of a household may or may not be related by blood to one another.</p> <ul style="list-style-type: none"> <li>• Floating population i.e. persons without any normal residence were not listed.</li> <li>• Households residing in open space, roadside shelter, under a bridge etc., more or less regularly in the same place were listed.</li> </ul>
<b>Household size</b>	<p>The size of the household i.e. the total number of members normally residing together in the household surveyed. It excludes temporary visitors and guests. Although, the determination of the actual composition of a household was left to the judgment of the head of the household, the following procedures will be followed as guidelines :</p> <ul style="list-style-type: none"> <li>• In deciding the composition of a household, more emphasis was placed on 'normally living together' than on 'ordinarily taking food from a common kitchen'.</li> <li>• In case the place of residence of a person is different from the place of boarding, the person is a member of the household with whom he or she resides.</li> </ul>
<b>Social group</b>	<p>Whether or not the household belongs to scheduled tribe or scheduled caste. If members of the household belong to different social groups, the group to which the head of the household belongs was taken.</p>
<b>Household type / Means of livelihood</b>	<p>The means of livelihood of a household was decided on the basis of the main source of the household's income during the 365 days preceding the date of survey. For urban samples it was classified as one of the following: [a] self-employed; [b] regular wage/salary earning; [c] casual labour and; [d] others.</p>
<b>Self-employed</b>	<p>Persons who operate a farm or non-farm enterprises or are engaged independently in a profession or trade or with one or a few partners. The essential feature of self-employment is that the remuneration is determined wholly or mainly by sales or profits of the goods or services which are being produced.</p>
<b>Regular wage/salaried</b>	<p>Persons working in farm or non-farm enterprises (both household and non-household) and getting in return salary or wages on a regular basis (and not on a periodic renewal of work contract).</p>
<b>Casual wage labour</b>	<p>A person casually engaged in farm or non-farm enterprises (both household and non-household) and getting in return wage according to the terms of the daily or periodic work contract.</p>
<b>House</b>	<p>Every structure, tent, shelter, etc., is a house irrespective of its use.</p>
<b>Type of structure</b>	<p>The type of structure of the dwelling unit of the household determined considering the structure having greater floor area. The relevant codes are: kutcha structure; semi-pucca structure; pucca structure.</p>
<b>Pucca structure</b>	<p>A pucca structure is one whose walls and roofs ( at least ) are made of pucca (permanent) materials such as cement, concrete, oven burnt bricks, stone, stone blocks, cement plastered reeds, iron and other metal sheets, timber, tiles, slate, corrugated iron, asbestos cement sheets, etc.</p>
<b>Kutcha structure</b>	<p>A structure which has walls and roof made of non-pucca (non-permanent) materials. Non-pucca materials include unburnt bricks, bamboo, mud, grass, leaves, reeds and/or other thatch.</p>
<b>Semi-pucca structure</b>	<p>A structure which cannot be classified as pucca or kutcha. Such a structure will have either the walls or the roof but not both made of pucca materials.</p>
<b>Average monthly consumer expenditure</b>	<p>The average monthly consumer expenditure worked out on the basis of the preceding 12 months. This was obtained from a working sheet provided for the purpose.</p>
<b>Monthly per capita expenditure</b>	<p>The average monthly consumer expenditure divided by the household size.</p>
<b>Annual amount of insurance premium</b>	<p>Actual amount of premium paid for 3 specified insurance policies made by the household during last 365 day; life insurance; medical insurance; accident insurance.</p>

Table A2.2 Description of outpatient care variables

<b>Item name</b>	<b>Item definition and description</b>
<b>Ailment - illness or injury</b>	Ailment, i.e. illness or injury, mean any deviation from the state of physical and mental well being. In other words, one was being treated as sick if one felt sick. An ailment may not cause any necessity of hospitalisation, confinement to bed or restricted activity. An ailing member is a normal member of the household who was suffering from any ailment during the reference period. Cases of sterilisation, insertion of IUD, getting MTP etc., pregnancy and child birth were not treated as cases of ailment. But abortions, natural or accidental, were treated as ailment. Attempt was made to treat ailment from two different causes as two cases of ailment even when the person is the same.
<b>Spell of ailment</b>	A continuous period of sickness owing to a specific ailment.
<b>Whether ailing during last 15 days</b>	For each member of the household, it will be enquired whether he/she suffered from any ailment during last 15 days. It may be noted that some ailments may be treated (either as an inpatient of a hospital or otherwise) and some untreated - both cases should be considered here.
<b>Severity of ailment</b>	Number of days of illness, confinement to bed and restricted activity owing to a spell of ailment represent different degrees of severity of the ailment. While recording the number of days confined to bed, the number of days in a hospital within the reference period will also be counted.
<b>Number of days ill</b>	The number of days the member suffered from the particular spell of ailment during the reference period. Chronic ailment involving periodic check up will be treated as a single spell. Days with illness meant the duration for which the member felt that he/she feels sick.
<b>Confinement to bed</b>	Refers to a state of health where the ailing person is required or compelled to mostly stay in bed at his/her residence/home.
<b>Restriction of activity</b>	The state of health which prevents the ailing person from doing any of his/her normal activity. For economically employed persons, restricted activity will mean abstention from the economic activity. In case of a house wife, this will mean cutting down of the day's chores. In case of retired persons, this will refer to the pruning of his/her normal activity. In case of students attending educational institution, this will refer to abstention from attending classes. For infants below school going age and for the very old, restricted activity was not considered. Days confined to bed were also counted as on restricted activity.
<b>Status of ailment</b>	The period of the spell of ailment with respect to the reference period: started more than 15 days ago: and is continuing [1]; and has ended [2]; started within 15 days: and is continuing [3]; and has ended [4].
<b>Medical treatment</b>	A person were considered to have received medical treatment if he/she has consulted a doctor any where (in OPD of a hospital, community health centre, primary health centre/sub-centre, dispensary, doctor's chamber, private residence etc.) and obtained medical advice on his ailment, whether within or outside the reference period. The doctor consulted may follow any system of medicine: allopathic, homeopathic, ayurvedic, unani, hakimi or some other recognised system. Self doctoring or acting on the advice of a non-medical person was not treated as treatment.
<b>Reason for no treatment</b>	Reason for not taking any medical treatment: no medical facility available in the neighbourhood [1]; facilities available but no treatment sought owing to: lack of faith. [2]; long waiting. [3]; financial reasons [4]; ailment not considered serious [5]; others [9].
<b>Whether any treatment received from non-govt. sources and if yes, reason</b>	If among the sources of treatment taken during the reference period, there is at least one source falling in the non-government category. The non-government sources are: private hospital, nursing home, charitable institution run by public trust, private doctor etc. The reason for availing private treatment: Govt. doctor/facility too far [1] (as the available govt. sources:); not satisfied with treatment [2]; long waiting [3]; lacks personal attention [4]; bad treatment [5]; doctor/staff corrupt/charge money [6]; medicines not available or ineffective if available [7]; private doctor more easily available [8]; others[9].



Table A2.3 Description of hospital care variables

Item name	Item definition and description
<b>Hospitalisation</b>	One will be considered hospitalised if one has availed of medical services as an indoor patient in any hospital during last 365 days. Hospital here refers to any medical institution having provision for admission of sick persons as indoor patients (inpatients) for treatment.
<b>Type of hospital</b>	The codes for types of hospitals are : public hospital [1]; primary health centre [2]; public dispensary [3]; private hospital [4]; nursing home [5]; charitable institution run by public trust [6]
<b>Type of ward</b>	The type of the ward where the patient was admitted (for the particular hospitalisation case). The codes are: free [1]; paying general [2]; paying special [3]. A paying ward with a number of beds will be treated as a paying general ward. A cabin (generally with one or two beds) will be treated as a paying special ward. The code for the type where the patient had stayed for the longest duration will be recorded here.
<b>When discharged</b>	The time with respect to the date of survey when the patient was discharged from the hospital. The codes are: not yet [1]; during last 15 days [2]; 16 days to 365 days [3].
<b>Duration of stay in hospital</b>	The duration of stay of the patient in the hospital within the reference period in number of days. Thus, the duration of stay will be ascertained as the number of days: (i) from the commencement of the reference period to the date of discharge, if admitted more than 365 days ago, and discharged within the reference period; (ii) from the date of admission to the date of discharge, if admitted and discharged within the reference period; (iii) elapsed since admitted, if admitted within the reference period and not yet discharged. In the most unlikely cases of continuous stay of more than 365 days, as on the date of survey, in a hospital, the entry against this item will be 365.
<b>Details of medical services received</b>	The codes are: not taken [1]; taken/done : free [2]; partly free [3]; on payment [4]. If a particular service is not required or not taken from the hospital, owing to non-availability or other reasons, code 1 will be recorded against it. If it is received free of any charge from the hospital, code 2 will be recorded, and if received partly free, code 3 will be recorded. When the patient is required to make full payment for the service received, code 4 will be recorded.
<b>Medicine</b>	<ul style="list-style-type: none"> <li>• Drugs or preparations used for treating an ailment are considered as medicine. For the survey, medicine will include such liquids, syrups, pills, tablets, capsules, injections, ointment, drips etc.</li> </ul>
<b>X-ray /ECG /EEG /Scan</b>	<ul style="list-style-type: none"> <li>• ECG stands for electro-cardiogram, EEG for electro-encephalogram and scan includes CAT scan, all computer aided X-ray, scanning of the body or brain and ultrasonography.</li> </ul>
<b>Other diagnostic tests</b>	<ul style="list-style-type: none"> <li>• Other diagnostic tests include all pathological tests, such as testing urine, stool, blood, sputum, tears, biopsy, all tests of eyes, audiogram for testing loss of hearing etc.</li> </ul>
<b>Surgery</b>	<ul style="list-style-type: none"> <li>• Treatment requiring an operation to cut into or to remove or to manipulate tissue or organs or parts of the body is considered as surgery. All surgical operations done within the reference period will be considered for this item.</li> </ul>
<b>Other treatment</b>	<ul style="list-style-type: none"> <li>• This includes: physiotherapy, i.e. treatment by massage exercise, with or without aid or gadget, or heat treatment or infrared lamps etc.; radiotherapy, i.e. treatment by radiation, like X-rays, gamma-rays etc.; electrotherapy, i.e. treatment by low frequency electric current; and other similar treatments.</li> </ul>

Table A2.4 Description of health care expenditure variables

Item name	Item definition and description
<b>Expenses incurred for treatment as inpatient during last 365 days</b>	Information on expenses incurred for treatment as inpatient, separately for each hospitalisation cases. The expenditures relate only to the part that relates to the period of hospitalisation within the reference period.
<b>Whether any hospital charges paid and amount of charges paid</b>	<p>Any amount is payable to the hospital for treatment during the stay in the hospital. The amount payable to the hospital includes all expenditure on items like:</p> <ul style="list-style-type: none"> <li>• bed charges (with charges for food, if included in it)</li> <li>• medicines (including drips) supplied by the hospital</li> <li>• materials for bandages, plaster etc. supplied by the hospital</li> <li>• fees for the services of medical &amp; para medical staff</li> <li>• charges for diagnostic tests done at the hospital</li> <li>• operations and therapies done at the hospital</li> <li>• charges for ambulance provided by the hospital</li> <li>• costs of oxygen and blood supplied by the hospital</li> </ul> <p>It did not include the expenses for the treatment in the hospital for the period that is not within the reference period. Any tips paid to the employees of the hospital will, however, be excluded from this item.</p>
<b>Total medical expenditure for treatment during the stay at hospital</b>	<p>The total expenditure for medical treatment during the stay in the hospital within the reference period. This included the entire expenditure recorded against item 5 and all other expenses for medical treatment. Items of expenditure to be included in other expenses are:</p> <ul style="list-style-type: none"> <li>• purchase of medicines, bandages, plaster, oxygen, blood etc. from outside the hospital</li> <li>• diagnostic tests and therapies done from outside the hospital</li> <li>• consultation fees paid to medical personnel outside the hospital</li> <li>• charges for ambulance when not provided by the hospital</li> </ul>
<b>Particulars of other expenses incurred by the household</b>	<p>Expenses other than those on medical treatment incurred by the household in connection with the hospitalisation case:</p> <ul style="list-style-type: none"> <li>• transport other than ambulance</li> <li>• lodging charges of escort(s)</li> <li>• attendant charges</li> <li>• personal medical appliances</li> </ul> <p>This includes transport charges paid for travelling to and from the hospital by the patients or escorts or visitors (excluding ambulance charges), transport costs incurred by the household for procuring medicines, blood, oxygen etc. for the treatment, etc. Examples of personal medical appliances are spectacles / contact lens, intra-ocular lens, hearing aid, trusses, crutches, artificial limb, pacemaker etc. Note that appliances like thermometer, infra-red lamp, blood-pressure measuring equipment, blood-sugar measuring kit, bed-pan / urinal etc. will not be treated as personal medical appliances.</p>
<b>Amount of household income lost in the last 365 days</b>	Loss of household income due to the hospitalisation of a working member of the household or disruption of usual activity of the working member of the household for a non-working member's hospitalisation.
<b>Particulars of sources of finance for meeting the expenses</b>	The particulars of how the total expenditure incurred by the household on account of hospitalisation was met: borrowing, sales of assets, current income and others. Under medical reimbursement scheme of the employer, the employee may be required to meet the medical expenditure initially which would be reimbursed subsequently by the employer. The amount reimbursed or expected to be reimbursed by the employer was recorded. The amount reimbursable from other agencies like insurance companies/ESIC/MEDICLAIM was recorded.

## APPENDIX 3 A few notes on multilevel analysis

### *Traditional approaches to the analysis of contexts*

Studies investigating the effect of urbanity on health mostly either employ ecological comparisons of individual living in urban compared to rural areas or comparison of aggregated characteristics of people and outcomes from different urban areas. These studies use regions as spatially defined proxy for exposure to characteristics assumed to be present in one area, but absent in the other. This ignores the heterogeneity found within and across various urban realities, and does not consider the specificity of local environments related to health outcomes (McDade & Adair, 2001). Furthermore, working at the aggregate level runs the risk of ecological fallacy by ignoring the role of individual-level variables (Diez-Roux, 2000).

This problem of ecological fallacies tends to push researchers to use individual data only (Curtis & Jones, 1998). This other extreme puts studies at the risk of committing what some have called the atomistic fallacy - overlooking or misinterpreting effects which can better be understood at the level of households, neighbourhoods or regions - by ignoring group membership. Furthermore, if outcomes for individuals are correlated within groups, the assumption of independence of observation is violated (Diez-Roux, 2000; Curtis & Jones, 1998).

Another traditional approach to analyse the effect of contexts on health related topics have been to perform tabulation and separate regression analysis for different areas. This could be inefficient and introduce bias by neglecting the correlation that can be found between areas with countries or districts (Curtis & Jones, 1998). One can also decide to work at the individual level only and integrate attributes of geographical or social contexts as individual attributes in regression models.

This incorporation of contextual characteristics, by disaggregating higher-level variables to the individual level and performing Ordinary Least Squares (OLS) regression analysis, (by

introducing dummy variables into regression models for example) is problematic since individuals are sampled within particular contexts. This causes all the non modelled contextual variation to enter the single individual level random term and signify that error terms of individuals are correlated, breaking the assumption of independence. This produces inefficient estimates and an increased tendency to find differences and relationships where none exists (Duncan, Jones & Moon, 1998; Diez-Roux, 2000).

Finally, one can also specify separate regression for each context or perform either ANOVA or ANCOVA to generate context-specific estimates. This involves including extra fixed terms in the model for each parameter that is allowed to take a different value in each contextual setting. This is unpractical, not efficient and non parsimonious with large numbers of groups or small numbers of observation per group. Furthermore, it does not examine how specific group-level properties affect individual level outcomes or interact with individual level variables (Diez-Roux, 2000; Duncan, Jones & Moon, 1998).

#### *The contribution of multilevel analysis*

Inequalities in access to health care found between cities and various parts of urban agglomerations could be the result of compositional and contextual factors. **Compositional** factors are characteristics of individuals and households grouped in specific localities. Some areas or social groups are thus composed of people sharing similar characteristics, which could influence access to health care. A purely compositional explanation would state that similar types of people might have similar access to health care and it is only differences in the type of people in various areas that determines geographical variations in access (Curtis & Jones, 1998).

**Contextual** factors are characteristics of areas of residence, or living environments, that may influence individuals or households access to health care (Mitchell et al., 2000). Regional discrepancies in access could be the result of specific influences of area characteristics (the level of poverty, the level of development of infrastructure) or compositional variables (concentration of individuals showing specific characteristics) (Harpham & Tanner, 1995; Satterthwaite, 1998). Most previous research on the geography

of health have been based on studies of the aggregated socio-economic characteristics of people living in particular areas (measures of social composition) rather than contextual characteristics of the places where people live (Ecob & MacIntyre, 2001). Multilevel models are useful to disentangle contextual and compositional factors. It does not only enable to assess the contributions of compositional and contextual factors, but also a way of describing how, and for whom, contextual effects matter (Duncan, Jones & Moon, 1998).

In multilevel models, communities are drawn from a population and their potentially different intercepts and slopes are treated as coming from two distributions at a higher level. Multilevel analysis summarises these higher level distributions in terms of two parts: a fixed part which is unchanging across context (this gives the average slope and intercept across all communities) and a random part which is allowed to vary (consists of variances which summarises the degree to which the community specific slopes and intercepts differ from these average values). In addition, the random part also summarises the degree of co-variability between higher-level distributions. Multilevel models work by assuming a specific distribution for the random part in the micro-model, while maintaining Normality assumptions for higher level random parts (Duncan, Jones & Moon, 1998).

The strength of contextual effects and the mechanisms by which contexts influence individual outcomes may vary with the level of aggregation (Blakely & Woodward, 2000; Soobader & Leclere, 1999). Several authors argue that, despite the risk of increase in measurement error, small areas should result in more valid and more stable measurements of area characteristics (Reijneveld, Verhij & de Bakker, 1999; Curtis & Jones, 1998). It is essential to use a level of aggregation that permits a fair confidence that the people under study share a certain physical and socio-cultural homogeneity regarding the variables collected (Curtis & Jones, 1998).

## APPENDIX 4 Complementary results

Figure A4.1 Multilevel model output: logistic regression, outpatient care utilisation

Equations

$$USE_{ij} \sim \text{Binomial}(\text{denom}_{ij}, \pi_{ij})$$

$$\text{logit}(\pi_{ij}) = \beta_{0j} \text{cons} + 2.071(0.397) \text{Bedridden}_{ij} + 1.328(0.379) \text{Ongoing episode}_{ij} + 1.532(0.532) \text{Below 18}_{ij} +$$

$$-2.042(0.678) \text{Extreme poor}_{ij} + 0.002(0.489) \text{Poor}_{ij} + -1.627(0.669) \text{Medium towns}_{ij} +$$

$$0.130(0.898) \text{Large towns}_{ij} + -0.900(0.522) \text{High poor (adj)}_{ij} + -1.575(0.633) \text{Low pucca}_{ij}$$

$$\beta_{0j} = 1.389(0.448) + \mu_{0j}$$

$$[\mu_{0j}] \sim N(0, \Omega_{\mu}) : \Omega_{\mu} = [0.965(0.329)]$$

$$\text{var}(USE_{ij} | \pi_{ij}) = \pi_{ij}(1 - \pi_{ij}) / \text{denom}_{ij}$$

Equations window controls: Name, Fonts, Add Item, Estimates, Nonlinear, Clear, Notation, Responses, Help

Figure A4.2 Multilevel model output: logistic regression, private outpatient care utilisation

Equations

$$TX\_NGOV_{ij} \sim \text{Binomial}(\text{denom}_{ij}, \pi_{ij})$$

$$\text{logit}(\pi_{ij}) = \beta_{0j} \text{cons} + 1.216(0.785) \text{Below 2}_{ij} + -2.057(0.703) \text{Extreme poor}_{ij} + -0.557(0.379) \text{Poor}_{ij} +$$

$$-0.620(0.301) \text{Casual work}_{ij} + 1.407(0.695) \text{Low public}_{ij} + 1.763(0.466) \text{High private}_{ij}$$

$$\beta_{0j} = 0.625(0.337) + \mu_{0j}$$

$$[\mu_{0j}] \sim N(0, \Omega_{\mu}) : \Omega_{\mu} = [0.394(0.274)]$$

$$\text{var}(TX\_NGOV_{ij} | \pi_{ij}) = \pi_{ij}(1 - \pi_{ij}) / \text{denom}_{ij}$$

Equations window controls: Name, Fonts, Add Item, Estimates, Nonlinear, Clear, Notation, Responses, Help

Figure A4.3 Multilevel model output: multinomial regression, source of hospitalisation

Equations

$$\text{resp}_{ijk} \sim \text{Multinomial}(\text{cons}_{jk}, \pi_{ijk})$$

$$\log(\pi_{1jk} / \pi_{0jk}) = \beta_{0k} \text{cons.Paying public}_{ijk} + -0.915(0.401) \text{Below 18 years.Paying public}_{ijk} +$$

$$-1.092(0.314) \text{50 years and older.Paying public}_{ijk} + -0.942(0.478) \text{Poor.Paying public}_{ijk} +$$

$$2.710(0.384) \text{Upper non-poor.Paying public}_{ijk} + 0.922(0.363) \text{Self-employed.Paying public}_{ijk} +$$

$$-0.485(0.376) \text{Casual labour.Paying public}_{ijk} + -0.437(0.568) \text{Low total bed density.Paying public}_{ijk} +$$

$$0.618(0.495) \text{High private-public ratio.Paying public}_{ijk}$$

$$\beta_{0k} = -1.146(0.510) + v_{0k}$$

$$\log(\pi_{2jk} / \pi_{0jk}) = \beta_{1k} \text{cons.Private}_{ijk} + 0.205(0.236) \text{Below 18 years.Private}_{ijk} + -0.171(0.196) \text{50 years and older.Private}_{ijk} +$$

$$-0.731(0.217) \text{Poor.Private}_{ijk} + 2.394(0.317) \text{Upper non-poor.Private}_{ijk} +$$

$$0.441(0.246) \text{Self-employed.Private}_{ijk} + -0.727(0.236) \text{Casual labour.Private}_{ijk} +$$

$$1.654(0.380) \text{Low total bed density.Private}_{ijk} + 2.172(0.372) \text{High private-public ratio.Private}_{ijk}$$

$$\beta_{1k} = -0.630(0.383) + v_{1k}$$

$$\begin{bmatrix} v_{0k} \\ v_{1k} \end{bmatrix} \sim N(0, \Omega_v) : \Omega_v = \begin{bmatrix} 0.290(0.227) & \\ 0.026(0.111) & 0.154(0.103) \end{bmatrix}$$

$$\text{cov}(y_{ijk}, y_{ijk}) = \pi_{ijk} \pi_{ijk} / \text{cons}_{jk} : s = r. \quad \pi_{ijk} (1 - \pi_{ijk}) / \text{cons}_{jk} : s = r.$$

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Figure A4.4 Multilevel model output: linear regression, hospital medical expenditure

$$\text{MED\_IN2}_{ij} = \beta_{0j} + 537.906(146.262)\text{paying public}_{ij} + 1014.991(86.665)\text{private}_{ij} + \\ -12.043(168.696)\text{chronic}_{ij} + 699.128(72.497)\text{more 7 days}_{ij} + 260.735(111.500)\text{middle}_{ij} + \\ 646.795(164.315)\text{rich}_{ij} + 214.668(192.851)\text{middle.chronic}_{ij} + \\ 550.320(272.533)\text{rich.chronic}_{ij} + e_{ij}$$

$$\beta_{0j} = -494.624(107.314) + u_{0j}$$

$$u_{0j} \sim N(0, \sigma_{u0}^2) \quad \sigma_{u0}^2 = 666455.900(60496.070)$$

$$e_{ij} \sim N(0, \sigma_e^2) \quad \sigma_e^2 = 234984.600(35077.610)$$

$$-2*\text{loglikelihood} = 11196.610(682 \text{ of } 682 \text{ cases in use})$$

Figure A4.5 Multilevel model output: linear regression, outside medical expenditure

$$\text{MED\_OUT2}_{ij} = \beta_{0j} + 249.196(111.514)\text{paying public}_{ij} + -0.713(64.604)\text{private}_{ij} + \\ 41.995(127.443)\text{chronic}_{ij} + 534.214(56.400)\text{more 7 days}_{ij} + 133.644(82.877)\text{middle}_{ij} + \\ 390.677(122.206)\text{rich}_{ij} + 241.829(145.822)\text{middle.chronic}_{ij} + \\ 411.017(205.912)\text{rich.chronic}_{ij} + e_{ij}$$

$$\beta_{0j} = 97.385(80.055) + u_{0j}$$

$$u_{0j} \sim N(0, \sigma_{u0}^2) \quad \sigma_{u0}^2 = 308064.300(37594.450)$$

$$e_{ij} \sim N(0, \sigma_e^2) \quad \sigma_e^2 = 189050.500(27861.210)$$

$$-2*\text{loglikelihood} = 10940.330(682 \text{ of } 682 \text{ cases in use})$$

Figure A4.6 Multilevel model output: linear regression, total hospital expenditure

$$\text{TOTAL2}_{ij} = \beta_{0j} + 821.875(284.050)\text{paying public}_{ij} + 1006.603(165.300)\text{private}_{ij} + \\ -10.758(325.300)\text{chronic}_{ij} + 1586.729(143.089)\text{more 7 days}_{ij} + 506.570(212.191)\text{middle}_{ij} + \\ 1376.368(312.854)\text{rich}_{ij} + 749.097(372.139)\text{middle.chronic}_{ij} + \\ 2286.333(525.577)\text{rich.chronic}_{ij} + e_{ij}$$

$$\beta_{0j} = -264.653(204.794) + u_{0j}$$

$$u_{0j} \sim N(0, \sigma_{u0}^2) \quad \sigma_{u0}^2 = 2116476.000(239105.100)$$

$$e_{ij} \sim N(0, \sigma_e^2) \quad \sigma_e^2 = 1140526.000(169041.200)$$

$$-2*\text{loglikelihood} = 12161.820(682 \text{ of } 682 \text{ cases in use})$$



Table A4.1 Predicted values of health care expenditure from General Linear Models

Fixed factors	Categories	Model 1	Model 2	Model 3	
		Hospital medical expenditure (INR)	Outside medical expenditure (INR)	Total health care expenditure (INR)	
Duration of stay	7 days or less	348 [207;489]	371 [273;470]	1282 [1019;1544]	
	> 7 days	<b>1196 [1049;1342]</b>	<b>934 [832;1036]</b>	<b>3008 [2736;3280]</b>	
Hospital	Free public	273 [119;426]	596 [488;703]	1577 [1291;1862]	
	Paying public	<b>756 [467;1044]</b>	710 [509;912]	2233 [1696;2769]	
	Private	<b>1287 [1174;1400]</b>	652 [573;731]	<b>2625 [2414;2835]</b>	
Type of illness	Acute illness	702 [566;839]	542 [447;637]	1698 [1445;1952]	
	Chronic illness	841 [667;1016]	<b>763 [641; 886]</b>	<b>2591 [2265;2917]</b>	
Economic status	Poor	295 [95;109]	309 [179;439]	792 [447;1138]	
	Middle class ( $\geq$ PL < 3PL)	<b>709 [582;835]</b>	<b>667 [578;755]</b>	<b>1876 [1640;2111]</b>	
	Rich ( $\geq$ 3PL)	<b>1312 [1080;1543]</b>	<b>983 [821;1144]</b>	<b>3766 [3335;4197]</b>	
<b>Interaction factors</b>					
Type of illness* Economic status	Acute illness	Poor	277 [110;443]	349 [232;465]	861 [551;1171]
		Middle class ( $\geq$ PL < 3PL)	<b>726 [569;882]</b>	557 [448;667]	<b>1743 [1452;2034]</b>
		Rich ( $\geq$ 3PL)	<b>1105 [850;1360]</b>	<b>719 [541;898]</b>	<b>2491 [2017;2965]</b>
	Chronic illness	Poor	313 [9;618]	269 [56;482]	724 [157;1290]
		Middle class ( $\geq$ PL < 3PL)	692 [529;855]	<b>776 [662;890]</b>	<b>2008 [1705;2312]</b>
		Rich ( $\geq$ 3PL)	<b>1518 [1138;1899]</b>	<b>1245 [980;1512]</b>	<b>5042 [4334;5749]</b>
Adjusted R <sup>2</sup>		0.359	0.279	0.399	

Table A4.2 Health expenditure for outpatient care services

Variables	Categories	Type of health care expenditure (INR)			
		Medical expenditure	Non medical expenditure	Total direct expenditure	Loss of household income
All cases		103	19	122	45
Caste	Scheduled castes (n = 24)	66	20	86	72
	Other castes (n = 227)	107	18	126	42
Household livelihood	Casual worker (n = 85)	84	11	95	53
	Self-employed (n = 81)	126	11	137	26
	Regular wage/salaried (n = 62)	100	42	142	71
Economic status	Poor (n = 43)	93	7	99	67
	Non poor ( $\geq$ PL < 3PL) (n = 179)	106	12	118	42
	Upper non poor ( $\geq$ 3PL) (n = 28)	102	79 <sup>a</sup>	182	21
Outpatient care sector	Public (n = 53)	68 <sup>a</sup>	11	79 <sup>a</sup>	89 <sup>a</sup>
	Private (n = 198)	113 <sup>a</sup>	20	133 <sup>a</sup>	32 <sup>a</sup>

<sup>a</sup> ANOVA  $p \leq 0.05$ 

CNCD: chronic non communicable diseases